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Journal of the History of Ideas

ARTICLES

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REVIEW

On a Marxian History of Literary Criticism: Bernard Smith's *Forces in American Criticism*
Morris R. Cohen

April, 1940

Volume I
Number 2

Journal of the History of Ideas

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VOLUME I, NUMBER 2 APRIL, 1940

THE NATIONAL SOCIALISTS' USE OF NIETZSCHE

BY CRANE BRINTON

Once more Nietzsche's name, as in 1914, is in the news. In the popular writings of dozens of commentators on the events of the day he is named as one of the important factors influencing German policies both internal and external. To this accusation the oddly-assorted group of Nietzscheans who have always maintained that the philosophy of their master is quite in accord with the best of our Western tradition, humane, peaceful, liberal, even Christian (in the profound sense, of course), reply, as they did in 1914, that the present masters of German policy misunderstand and misapply his doctrines. Furthermore, they sometimes add, Nietzsche was a kindly soul, a real philosopher, and everybody knows that philosophers are not in the least responsible for what politicians do—everybody, that is, except some English and American publicists, who have very naïve notions of the rôle of ideas in politics.[1]

The *Journal of the History of Ideas* will inevitably in these days have to occupy itself much with the questions centred round the great problem of the relation between ideas—especially more or less abstract ideas—and the rest of what goes on in this world. We may here be permitted to leave this larger problem unconsidered, and ask ourselves what *use* the German National Socialists have made of Nietzsche, in what way they have appealed to his writings. We do not thus sheer off from the question of Nietzsche's influence on contemporary German politics, or from that of his responsibility for present conditions, out of cowardice, or out of despair of obtaining sensible answers, but simply because it seems better to ask modest questions, questions of limited theoretical scope, first. Only after much more clarity has been brought to the investigation of what con-

[1] Thus M. Henri Lichtenberger in an article on "Nietzsche et la crise de la culture contemporaine," *Nouvelle revue de Hongrie*, October 1935, Vol. 53, p. 285. The whole article is a good example of what seems to me to be the bowdlerizing, the sugaring and softening of Nietzsche's doctrines. Classics of this treatment of Nietzsche are Charles Andler, *Nietzsche: sa vie et sa pensée*, 6 vols. (Paris, 1920–1931), and Daniel Halévy, *Life of Nietzsche* (New York, 1911) (translated from the French). Odd that the French should be so unrealistic about Nietzsche. But we Americans have made our own contributions to the softening process also, as, for instance, W. M. Salter, *Nietzsche the Thinker* (New York, 1917).

temporary Germans have found in Nietzsche's teaching (or say or think they have found there) can we proceed to the difficult task of deciding whether Nietzsche really put it there, and to the still more difficult task of estimating the actual potency of Nietzsche's work in relation to the deeds and plans of the present German régime. We shall not in this paper even touch upon this last question; and as to whether what the Nazis find in Nietzsche was really intended by the philosopher we shall hazard no more than a few tentative conclusions. Our main concern is with what National Socialists say Nietzsche means to them.

* * * * *

The works of Nietzsche are one of the principal divisions of the National Socialists' holy writings. The entire canon is not yet made up, but just as it is clear that *Mein Kampf* will probably be its central piece, so it is clear that Nietzsche, along with Gobineau, H. S. Chamberlain, Treitschke, Rosenberg, and other preachers of the creed of race and power, will provide essential parts of the finished doctrine. Nietzsche has been much written about in Germany since the rise of the Nazis. He had been since about 1900 a favorite subject for the erudite and the literary; besides the well-known general works of Riehl, Vaihinger, Richter and Richard Meyer, there are Ph.D. theses like *Nietzsche und das Ding-an-sich*, essays like "Nietzsche und das Wetter," a whole literature on the Nietzsche-Wagner controversy, special studies like Podach's book on Nietzsche's mental collapse, which broke the hearts of the more sentimental and old-fashioned Nietzscheans by publishing a hospital record in which under Nietzsche's name appeared the entry: "1866. *Syphilit. Ansteckg.*"[2] The supply of such learned biographical and philosophical studies, however, seems fairly constant. What is more significant is the appearance in recent years of a number of short popular books expressly intended to make Nietzsche clear to ordinary literate persons, and to show just how his ideas fit into the Nazi *völkische Weltanschauung*. Fair samples of such books are Alfred Baeumler's *Nietzsche der Philosoph und Politiker*, published in 1931 in *Reclams Universal-Bibliothek*, which is a sort of German equivalent of our Home University Library; Hans Prinzhorn's *Nietzsche und das XX Jahrhundert*, which in 1928 already antici-

[2] Fritz Sprengel, *Nietzsche und das Ding-an-sich*, Inaugural-Dissertation, Koenigsberg in Pr., 1933; Paul Cohn, in his volume *Um Nietzsches Untergang* (Hannover, 1931); E. F. Podach, *Nietzsches Zusammenbruch* (Heidelberg, 1930).

pated official Nazi interpretations of Nietzsche's work; Richard Oehler's *Friedrich Nietzsche und die deutsche Zukunft,* published in 1935; and the handbook which Heinrich Haertle brought out in 1937 under the title of *Nietzsche und der Nationalsozialismus.* Nietzsche's name appears frequently in current German periodicals, and by no means solely in philosophical and other learned journals. Here again the titles show how the writers are working to impress Nietzsche into the service of the new Nazi society: "Nietzsche und wir," by M. O. Johannes in *Hammer* for January, 1938; "Nietzsche und der Norden," by M. Oehler in *Der Norden* for 1938, *Beilage;* F. Dehn's "Nietzsches Prophetie der Gottlosigkeit" in *Die Furche,* vol. 23 (1937); O. Haug, "Nietzsche und das Judentum" in volume 14 of *Weltkampf* (1937).

The *Historisch-kritische Gesamtausgabe* of the works and letters of Nietzsche is coming along slowly with the aid of the Nietzsche-Archiv in Weimar. It is being undertaken with the care, reverence, and detail given usually only to the works of great men of letters or great prophets. The four volumes so far issued reach only to Nietzsche's days as a student at Leipzig—they are all, in fact, mere juvenilia. Apparently any scrap of paper he traced his childish fancies on seems to the editors worth reprinting. As a thorough editorial job—and also, though this must be an accident, somewhat in format and general appearance—this *Gesamtausgabe* resembles another famous *Gesamtausgabe* that used to come out of Germany before 1933—that of Marx and Engels.

Finally, the Führer himself has publicly gone on record as having learned something from Nietzsche. Hitler does not specifically mention Nietzsche among the authors he read in his idle Vienna days, but it seems likely that many of Nietzsche's notions filtered down to him at second hand even before he went actively into politics. Since the revolution of 1933, Hitler has made several public visits to the Nietzsche-Archiv in Weimar and has had himself photographed there. One of these photographs, printed as the frontispiece in Richard Oehler's *Nietzsche und die deutsche Zukunft,* may have an unintentional symbolism. It shows the Führer in profile, staring with an expression of gloomy reverence at a bust of the Master. But though Hitler's face is fully shown, the photographer cut Nietzsche's in half, leaving one stone mustache curving off into nothing.

Nietzsche, then, has clearly been admitted into the Nazi pantheon, and his writings are a part of Nazi education. He wrote, it is true, much that needed adaptation, or exegesis, before it could be considered fit for use in the Third Reich. But he is obviously a precious ally, whose works and reputation bring to the rather miscellaneous collection of ideas assembled by the Nazis an element otherwise lacking. For Nietzsche, hated or scorned though he might be by some of the leaders of Western thought, was yet generally accepted among educated men as a writer who counted, as a sensitive artist, a master of German prose, a philosopher. Nietzsche, in short, was *sérieux;* Gobineau, Houston Stewart Chamberlain, Adolf Stöcker and the other anti-Semites—they, in the eyes of the unconverted, were not *sérieux.* Even *Mein Kampf,* as a contribution to world-literature, seemed to the outer world, and to much of Germany, lacking in the final distinctions of literary form and philosophical penetration. By the inclusion of Nietzsche among its Early Fathers, the National Socialist doctrine seemed to acquire these distinctions.

* * * * *

There is much in Nietzsche which is directly useful to the Nazis and can therefore be taken over intact as Nietzsche wrote it. Notably, there are countless passages condemning nineteenth-century bourgeois civilization as decadent, stuffy, soft, unworthy of the hard Nordic inheritance of Germans. Herr Rauschning has at last driven home to Americans the fact that the National Socialist movement is revolutionary, even though it does not use the sacred words we usually associate with revolutions in our own and modern European history. A good Nazi curls his lips as scornfully round the word "bourgeois" as a Marxist does. Nietzsche's contempt for the nineteenth century and all its works, his attacks on Christianity, on humanitarian movements, on parliamentary government, that "destructive" part of his writings which in verve and clarity is the best part—all this is just what the convinced Nazi wants to hear.

> Democracy has in all ages been the form under which organizing strength has perished. . . . Liberalism, or the transformation of mankind into cattle. . . . Modern democracy is the historic form of the decay of the state. . . . The two opposing parties, the socialist and the national—or whatever they may be called in the different countries of Europe—are

worthy of each other; envy and laziness are the motive powers in each of them.[3]

What more could any follower of Hitler wish, unless, perhaps, the addition that if a party were christened with *both* names—socialist and nationalist—it would not have the defects of either? "The equality of souls before God, this lie, this screen for the *rancunes* of all the base-minded, this anarchist bomb of a concept, which has become the last revolution, the modern idea and principle of the destruction of the whole social order—this is Christian dynamite.'"[4] Here Christianity and democracy are both damned, but also made to appear as partners in preparing for the destruction of the old society out of which the new society is to come.

There is also much in Nietzsche that helps to picture, with proper vagueness, the new society which, like all revolutionaries, the National Socialists are sure they are building. If the old society was parliamentarian, pacific, at least in hope, tolerant of individual differences, devoted—at least in principle—to free speech and other civil rights, and contented with an unheroic and comfortable present, the new society will be authoritarian, militant, contemptuous of such outmoded eighteenth-century notions as those of natural rights and individual happiness, a society harsh and heroic, a new Sparta of Supermen. Nietzsche's praise of war and the soldier is already a commonplace:

> The future of German culture rests with the sons of Prussian officers. . . . Peace and letting other people alone—this is not a policy for which I have any respect whatever. To dominate (*herrschen*) and to help the highest thought to victory—that would be the only thing that could interest me in Germany. . . . The same discipline makes the soldier and the scholar efficient; and, looked at more closely, there is no true scholar who has not the instincts of the true soldier in his veins. . . . Ye shall love peace as a means

[3] Nietzsche, *Götzendämmerung,* "Streitzüge eines Unzeitgemässen," Aphorismus 39, 38; *Menschliches, Allzumenschliches,* Part I, 472; *ibid.,* 480. Nietzsche's works, except his first book, *Die Geburt der Tragödie,* are composed of separate, and usually brief, aphorisms (in *Also sprach Zarathustra* brief chapters). References to his works therefore are usually given by aphorism or chapter number rather than by page, a method which makes a reference equally readily checked in any edition of the original and in translation. I have generally used the English of the authorized English translation of Nietzsche's works, in eigtheen volumes, edited by Dr. Oscar Levy.

[4] *Der Antichrist,* 62.

to new wars—and the short peace more than the long. . . . War and courage have done more things than charity. Not your sympathy but your bravery hath hitherto saved the victims. . . .[5]

The point need hardly be labored; Nietzsche's preaching to Germans to be hard, stern, disciplined, not the cheerful, philosophical, *gemütlich* folk European tradition, even after the Franco-Prussian war, still made them out to be—this preaching was reflected in German intellectual fashions well before 1933.

The Nazis can also find support for their current racial doctrines in the work of Nietzsche. One passage is especially famous, since Allied propaganda in the late Four Years' War picked it out:

It is impossible not to recognize at the core of all these aristocratic races the beast of prey; the magnificent blonde brute, avidly rampant for spoil and victory; this hidden core needed an outlet from time to time—the Roman, Arabic, German, and Japanese nobility, the Homeric heroes, the Scandinavian Vikings, are all alike in this need. It is the aristocratic races who have left the idea "Barbarian" on all the tracks in which they have marched. . . . The profound, icy mistrust which the German provokes as soon as he arrives at power, even at the present time, is always still an aftermath of that inextinguishable horror with which for whole centuries Europe has regarded the wrath of the blonde Teuton beast.[6]

Nietzsche affords passages still closer to what the Germans today mean by *Rassenhygiene*. Europe is degenerating because of the shocking mixture of blood modern times have brought about: "Europe, the scene of a senseless, precipitate attempt at a radical blending of classes, and *consequently* of races, is therefore sceptical in all its heights and depths, . . . sick unto death of its will."[7] There is, however, as Nietzsche insists in the very next breath, "the

[5] *Genealogy of Morals*, "Peoples and Countries" (English translation, London, 1913), 14 and 17. This section is not included in some German editions of this books. It is probably a rejected portion of *Jenseits von Gut und Böse. Der Wille zur Macht*, 912; *Also sprach Zarathustra*, Part I, chapter 10.

[6] *Zur Genealogie der Moral*, Part I, 11. Haertle in his *Nietzsche und der Nationalsozialismus*, page 62, quotes this approvingly and stops short just as I have in the above passage. Actually Nietzsche continues: "although between the old Germans and ourselves there exists scarcely a psychological, let alone a physical, relationship." This suppression is indicative of one of the ways in which the party exegetes adapt Nietzsche for direct political use. Note, by the way, that the Japanese already seem "honorary Aryans" in 1887, when the *Genealogy of Morals* was published.

[7] *Jenseits von Gut und Böse*, 208.

scepticism of daring manliness, which is closely related to the genius for war and conquest"; this is Frederick the Great's kind of scepticism, and is of course a good thing, and German.

Nietzsche's views on how to produce these pure, fighting souls are a mixture of Plato, second-hand and badly understood genetics (of the 1870s), and a whole set of prejudices natural to a middle-class German intellectual of that decade. He stoops occasionally to concrete proposals—characteristically in a field in which, as a bachelor, he had had less experience than is customary, even among German philosophers.

> Concerning the future of marriage—A super-tax on inherited property, a long term of military service for bachelors. . . . Privileges of all sorts for fathers who lavish boys upon the world, and perhaps plural votes as well. A medical certificate as a condition of marriage, endorsed by the parochial authorities, on which a series of questions addressed to the parties and the medical officers must be answered ("family histories"). As a counter-agent to prostitution, or as its ennoblement, I would recommend leasehold marriages, to last for a term of years or months, with adequate provision for the children.[8]

There is much more about degeneracy, good blood and bad, mixed races, family discipline, all perfectly suitable for reprinting in the *Nationalsozialistische Monatsheft*—although, indeed, it has already appeared in dozens of forms in Nazi literature, without specific acknowledgments to Nietzsche.

Scattered through Nietzsche's work is a good deal of material suitable for anti-Semitic use. Nietzsche himself had Jewish friends —if one may use the word friendship of any relation between Nietzsche and another human being—and some Jewish writers have for years been among the most ardent and uncritical of Nietzscheans. Yet most of the stock of professional anti-Semitism is represented in Nietzsche: the Jews are intellectuals with a grievance, hence destroyers of what makes for stability in society; they run the press and the stock-exchange, to the disadvantage of the slower-witted but more honest and healthy Gentiles; they are parasites, decadents; they are responsible for the three great evils of modern civilization—Christianity, Democracy, Marxism.[9]

[8] *Der Wille zur Macht*, 733.

[9] For samples, see *Die fröhliche Wissenschaft*, 301; *Götzendämmerung*, Part IV, 26; *Der Wille zur Macht*, 184, 864; *Jenseits von Gut und Böse*, 251; and especially *Der Antichrist*, 24–27.

Nietzsche, then, fits into National Socialist needs both in what he damned and in what he praised. He damned democracy, pacifism, individualism, Christianity, humanitarianism, both as abstract ideals and as, in some vague way, actual descriptions of modern European society. He praised authority, racial purity, the warrior spirit and practice, the stern life and the great health, and urged upon his fellow-citizens a complete break with their bad old habits and ideas. The spirit in which he urged this break, and the book which he hoped would be the bible of the new dispensation, are both worth our attention here. It may well be that the relatively concrete hatreds and hopes we have just been outlining are more important in current Nazi education than such Nietzschean abstractions as the "transvaluation of all values," the "Superman" and the "Will to Power," or such Nietzschean poetic and prophetic strains as resound in *Also sprach Zarathustra;* none the less, both Nietzsche's metaphysics and his prophetic writings are popular in contemporary Germany, and throw additional light on the temper of Nazi civilization.

In fact, most of Nietzsche's grand abstract terms, though they can be given a variety of interpretations, contain overtones, implications, admirably suited to Nazi uses. The famous phrase "Will to Power" suggests ruthlessness, aggression, a policy of expansion perfectly illustrated since Hitler's accession to power. The concept of a new race of Supermen, though Nietzsche himself left it as obscure in form and in detail as are most such eschatological concepts of recent invention, has proved very flattering to an aspiring Nazi *élite,* who have considered that they were at least making possible the development of a new race of men.[10] Moreover, though Nietzsche was even less clear than Shelley as to just how it was to come about, like Shelley he was obsessed with the notion of a beneficent and catastrophic renewing of the world—revolution is too mild a term—in which all would be good, nothing evil. But Nietzsche insisted that the great mark of this renewing would be "the transvaluation of all values," the *Umwertung aller Werte,* which was one of his best-loved phrases. Just what, in terms of actual human conduct, Nietzsche meant to suggest by this phrase is not altogether clear. At all events, he talked about all that had been considered evil becoming good in the new society, all that had been considered good becoming evil, and he praised cruelty, lying, and lofty sinning

[10] For instance, R. Oehler, *Nietzsche und die deutsche Zukunft,* p. 121.

generally. Yet he never achieved any very heroic sins on his own account. His life was that of a bookish, wandering and lonely eccentric, and was marked by not infrequent displays of pity for suffering men and animals. Nevertheless, his attack on Christianity seemed—as indeed it was—fresher and more sweeping than the usual complaints of weary nineteenth-century Voltaireans or positivists, or even of Marxians, since it was directed not merely against the theological dogmas but the moral temper and basic values of Christianity. The Nazis have found in his philosophy a much better base for sniping at organized Christianity than in mere conventional free-thinking, partly because it goes so well with Nazi scorn for so "Latin" (or "Jewish") an activity as reason. Above all, the passion for remaking, for renewing, the desire to be born again, which is found in all great revolutionary movements, and especially among the revolutionary *élite,* finds with the Nazis a justification and a vocabulary in the words of Nietzsche.

Also sprach Zarathustra, which is doubtless Nietzsche's best known work both within and without Germany, was meant by its author to attract disciples. Nietzsche had no such belief in the potency of the intellect as to suppose that he could move ordinary people by aphorisms and logic, so he deliberately wrote also, in parables, sermons, and what is, no doubt justly, called poetic prose, a long, rambling account of the mission of Zarathustra to pave the way for the coming of the Superman. Zarathustra, who has, of course, nothing but the name in common with the historical Zoroaster, is as much nineteenth-century Nietzsche as the Persians, Hottentots and Hurons who proved such good social critics, were eighteenth-century French men of letters. *Also sprach Zarathustra* has become a kind of *Enchiridion* for half-educated intellectuals throughout the world. Its pseudo-biblical prose and elevated obscurities are now and then cut through by a shaft of Nietzsche's ironic clarity, but even in the German original the book seems to many (including the present writer) forced in its rhetoric, false in its taste, off-key throughout—still more so when translated into English, and most of all when translated into French.

Yet the long white robes, prophetic beard, and phosphorescent glance of Zarathustra, though, to anyone with eyes trained to look distrustingly on prophets, they look like the stage-trappings they are, have unquestionably helped Nietzsche to his present prestige in a Germany made by post-war difficulties an ever more fruitful soil

for prophetic activity. Zarathustra does not have a program. He never comes out in the open with a specific suggestion for reform. But most of the ideas Nietzsche works out more sharply in his more analytical books appear in *Also sprach Zarathustra,* impressively shrouded in poetic inspiration. Here Nietzsche trumpets loudly his greatest discovery: "God is dead!" Here he calls out: "I teach you the Superman. Man is something that is to be surpassed. . . . What is the ape to man? A laughing-stock, a thing of shame. And just the same shall man be to Superman, a laughing-stock, a thing of shame. . . . Verily a polluted stream is man. One must be a sea, to receive a polluted stream without becoming impure. Lo, I teach you the Superman: he is that sea; in him can your great contempt be submerged." Now and then a passage or two stands out, ready for immediate use as a Nazi text: "No people could live without first valuing; if a people will maintain itself, however, it must not value as its neighbor valueth."[11] Nothing ever happens in the book, though Zarathustra goes striding up and down the earth throughout its pages, preaching at every turn of the road. At last a strange collection of men and animals come together in what Nietzsche may have meant to be a parody on the Last Supper, an ass brays through a litany, Zarathustra sings his well-named Drunken Song, and for the last time leaves his cave "glowing and strong, like a morning sun coming out of gloomy mountains."[12]

This is the "great noontide." A meaningless phrase? Not, alas, in the vocabulary of faithful, earnest, revolutionary Nazis. The vagueness, the dithyrambic energy, the mantic arts, the tortured rhetoric of Zarathustra can clearly move men in a way no concrete proposals at the level of mere laws or arrangements ever can.[13]

• • • • •

Much, then, of what Nietzsche wrote fits in neatly with what National Socialists want to hear. But he also wrote many passages which they cannot bear to hear at all. It would be possible to list numerous specific passages from Nietzsche's works which, if written in Germany today, would probably send the author straight to a concentration camp. Defenders of Nietzsche among adherents of democracy, humanism, internationalism, the moral traditions of

[11] *Also sprach Zarathustra,* Prologue, 2, 3; Part I, 15.

[12] *Ibid.,* Part IV, 72, 78, 80.

[13] Nietzsche's rhetoric in this book is also sometimes self-torturing—for instance, ch. 13—which is one reason why many kindly intellectuals like him.

Christianity, have for years been able to confront with a whole string of nice quotations those who attacked Nietzsche as the enemy of all these things. We must look into some of these passages, if only to understand the difficulties Nazi preachers and educators find in their use of Nietzsche.

First, Nietzsche is certainly responsible for some of the harshest things ever written about Germans.

> I confess it, these Germans are my enemies. I despise every sort of uncleanliness in concepts and valuations in them, every kind of cowardice in the face of every honest yea or nay. For almost one thousand years, now, they have tangled and confused everything they have laid their hands on. . . . The Germans are impossible for me. When I try to think of a man who runs counter to all my instincts, the result is always a German.

The Germans are muddle-headed, soft-hearted metaphysicians, incurable sentimentalists, vague and wordy romanticists with no feeling for style, hopelessly enmeshed in Christian and Protestant soul-searchings, totally lacking in *esprit,* in true gaiety. Germans are not even racially pure:

> The Germans may well be the most mixed of all peoples. . . . Bismarck a Slav. . . . Let anyone look upon the face of the Germans. Everything that had manly, exuberant blood in it went abroad. Over the smug populace remaining, the slave-souled people, there came an improvement from abroad, *especially by a mixture of Slavic blood.*[14]

There was, indeed, very little in his Germany which Nietzsche could abide at all. He manages in the following passage to damn about everything prized in the great Germany of Bismarck's era:

> . . . a people that suffers and *wants* to suffer from national nervous fever and political ambition: for instance, among present-day Germans there is alternately the anti-French folly, the anti-Semitic folly, the anti-Polish folly, the Christian-romantic folly, the Wagnerian folly, the Teutonic folly, the Prussian folly (just look at those poor historians, the Sybels and

[14] Italics mine. The best of numerous passages in Nietzsche's writings where Germany is discussed is the short section called "Peoples and Countries" appended to the English edition of *The Genealogy of Morals.* The last quotation above is from this section. The others: *Antichrist,* 61; *Ecce Homo,* Part XIV, 4; A. Baeumler, ed: *Die Unschuld des Werdens,* Vol. II, 1164. This last is a systematic collection of Nietzsche's literary remains. Vol. II, section VII "Europa: Die Deutschen" is especially valuable here.

Treitschkes, and their closely bandaged heads) and whatever else these little obscurations of the German spirit and conscience may be called.[15]

Here is a further example of how difficult it is for the Nazis to accept Nietzsche *en bloc*—and also of how valuable to them his occasional flashes of divination and agreement must be:

I observe more inclination towards greatness in the feelings of the Russian nihilists than in those of the English Utilitarians. We require an intergrowth of the German and Slav races, and we require, too, the cleverest financiers, the Jews, for us to become masters of the world.

(a) The sense of reality.

(b) A giving-up of the English principle of the people's right of representation. We require the representation of the great interests.

(c) We require an unconditional union with Russia, together with a mutual plan of action which shall not permit any English notions to obtain the mastery in Russia. No American future?

(d) A national system of politics is untenable, and embarrassment by Christian views is a very great evil. In Europe all sensible people are sceptics, whether they say so or not.[16]

This is a set of slogans for world-mastery on which the present rulers of Germany seem to be in a measure really acting—though without the voluntary aid of the Jewish financiers. It was written in the mid-1880s.

As this last passage suggests, Nietzsche was certainly no ordinary nineteenth-century nationalist. He not only thought ill of Bismarck's empire. He used, with almost as much frequency as his more obviously aggressive pet phrases, the phrase "we good Europeans."

I see *over and beyond* all these national wars, new "empires" [a thrust at the second Reich], and whatever else lies in the foreground. What I am concerned with—for I see it preparing itself slowly and hesitatingly—is the United Europe. It was the only real work . . . of all the broadminded and deep-thinking men of this century—this preparation of a new synthesis, and the tentative effort to anticipate the future of the "European."

It is true that this can be readily turned into Nazi doctrine: the Germans are to be the new Europeans, the United Europe is to be

[15] *Jenseits von Gut und Böse*, 251.

[16] *The Genealogy of Morals*, "Peoples and Countries," 17. In German this passage is to be found in the Naumann "Taschen-Ausgabe," 1906, Vol. VIII, and in Baeumler's edition of the remains, *Die Unschuld des Werdens*, Vol. II, 1183.

Greater Germany. But Nietzsche puts in inconvenient twists like: "To be a good German means to un-Germanize oneself." This is cryptic enough. If we add as a final touch Nietzsche's many attacks on theories of race, we have a task for the most skillful exegete.

> What quagmires there must be about, if it is possible, in the modern European hotch-potch, to raise questions of "race"! (It being premised that the origin of such writers is not in Horneo and Borneo.) Maxim: to associate with no man who takes any part in the mendacious race swindle.[17]

Moreover, Nietzsche, though he repeats many of the conventional arguments and accusations against the Jews, was not a good nor a trustworthy anti-Semite. Haertle, indeed, admits that he was "an anti-anti-Semite." "The anti-Semites," writes Nietzsche, "do not forgive the Jews for having both intellect and money. Anti-Semites —another name for 'bungled and botched.' " The closest he comes to saying something good about the anti-Semites is in a letter to his sister, who had married one of their leaders. "I can find a good deal to say in their favor, since there are so many among them worthy of all respect, efficient and strong-willed persons." He continues, however: "Yet all this does not prevent me from waging war upon anti-Semitism—nay rather, it compels me to fight a movement which wastes and weakens so much vital power." Sometimes Nietzsche's antipathy to his countrymen finds relief in turning to the contrasted features which he finds in the Jew:

> What a blessing a Jew is among Germans! See the obtuseness, the flaxen hair, the blue eye, and the lack of intellect in the face, the language, and the bearing . . . among Germans. . . .

And to the Jews as a race he attributed precisely the qualities which the *völkisch* doctrine of Nazism was to claim for the "Aryans": "The Jews are beyond all doubt the strongest, toughest and purest race now living in Europe. . . . It is certain that if they desired—or if they were driven to it, as the anti-Semites seem to wish—the Jews *could* now have the ascendancy, nay, literally the supremacy, over Europe." Luckily for the Germans, Nietzsche finds, the Jews do not desire this, but prefer to be "insorbed and absorbed by Europe; . . . and one should certainly take account of this impulse and tendency, and *make advances* to it . . . : for which

[17] *Genealogy of Morals,* "Peoples and Countries," 18, 20, 21; *Die Unschuld des Werdens,* Vol. II, 1150.

purpose it would perhaps be useful and fair to banish the anti-Semitic brawlers out of the country."[18]

Worse yet—Nietzsche occasionally wrote like an anarchist, and attacked the state. "A state is the coldest of all cold monsters . . . the state lieth in all languages of good and evil; and whatever it saith it lieth; and whatever it hath it hath stolen."[19] And not only the state, but also society:

> Society [*die Gesellschaft*] kills, tortures, robs of freedom and property—all this, it is true, out of necessity. But it is exactly this sort of behavior that is treated with especial honor as "Right," morality, maintaining and furthering the Good.[20]

The man who called himself the "last anti-political German" was a sufficiently good contemporary of the late nineteenth-century aesthetes to write that "Culture and the state . . . are antagonists. The one lives upon the other. . . . All great periods of culture have been periods of political decline. . . . Goethe's heart opened at the coming of Napoleon—it closed at the thought of the 'Wars of Liberation.' "[21]

Finally, not even the Nietzschean doctrine of the Superman is altogether safe for Nazi use. If it were only quite clear that Nietzsche meant simply to prophesy the coming of Hitler—or alternatively, if he had only made it evident that *all* Germans were Supermen in contrast to the herd-men of the rest of the world! But Nietzsche is almost explicit that even among blonde, blue-eyed Nordics there are many who must remain members of the herd, subject to slave-morality. The chosen are very few, and it seems unlikely that even the brownshirts are few enough. The point is that, however attractive Nietzsche's rather intellectualized and ascetic ideas of aristocratic leadership may be to Nazi leaders, they are hard to adapt to the popular teaching of a party which has carefully preserved the word "socialist" in its official name. Official Nazi propaganda, in the midst of *Kraft durch Freude* and Labor Fronts, cannot prudently dilate upon the theme that eighty million Germans are destined forever to be slaves. Yet scorn for "the great masses"

[18] Haertle, *Nietzsche und der Nationalsozialismus*, p. 45; *Der Wille zur Macht*, 864; E. Förster-Nietzsche, *The Life of Nietzsche*, (English translation, New York, 1915) Vol. II, p. 252; *Jenseits von Gut und Böse*, 251.

[19] *Zarathustra*, Part I, 11.

[20] *Die Unschuld des Werdens*, Vol. II, 1056.

[21] *Ecce Homo*, Part I, 3; *Götzendämmerung*, "Was den Deutschen abgeht," 4.

(and it is primarily the German masses that are in question) can hardly be said to be concealed in the famous chapter on "War Propaganda" in *Mein Kampf*, or in the exposition of the *Führerprinzip* in the chapter on *Persönlichkeit und völkischer Staatsgedanke*. The organization of the State "must in itself be the embodiment of the endeavor to put the heads above the masses and to subject the masses to the heads," since the masses are "incapable of thinking (*nicht denkfähig*) or incapable of doing so competently," but can attain what is best for them "only under the leadership of those whom Nature has endowed with special gifts."[22]

The Nazis, then, are obviously placed in regard to Nietzsche in a position not uncommon among men who try on this earth to set up holy writings. *There has to be exegesis* (we are trying very hard to use nice words). Lenin, for instance, had to find in Marx what Marx had quite explicitly *not* put in his writings—a *rationale* for the first great successful proletarian revolution taking place in such a country as Russia. Stalin himself has had to find much in both Lenin and Marx that was at least pretty well hidden. Nietzsche, because of his subtlety, his willful artist's variations, his love for what he called *nuances*, gives almost too much scope for those who are trying to hew out the party line. He committed too many infidelities to be a good Father—or Grandfather—of his Country.

Nevertheless, almost everything he wrote has been explained, and much of it explained away. Some Nazi commentators have adopted the simple device of not mentioning the parts of Nietzsche's work shocking to Nazi sensibilities, or of passing them by lightly as mere sport, mocking intellectual horseplay of the kind Germans enjoyed in the old Valhalla, and will enjoy in the new. Prinzhorn sees Nietzsche as engaged in a lifelong struggle with the nineteenth century, as the clear prophet of the Third Reich. Oehler is not more critical, and can rise to astonishing heights:

> And so we might turn a sharp passage in the *Antichrist* quite around, and get thereby simply a National Socialist confession of faith.
>
> "The Cross [*Kreuz*] as sign . . . *against* health, beauty, sense, bravery, intellect, kindliness of soul—*against Life itself.*"
>
> The Swastika [*Hakenkreuz*] as sign *for* health, beauty, sense, bravery, intellect, kindliness of soul—*for Life itself.*[23]

[22] *Mein Kampf*, 1932, p. 497.

[23] R. Oehler, *Nietzsche und die deutsche Zukunft*, p. 24.

Perhaps more common is the admission that Nietzsche did make mistakes; but such admission is immediately followed by various explanations calculated to free him from blame. Haertle is frank about the matter. Some parts of Nietzsche's writings, he admits, are really the *opposite* of Nazi truth. "In the measure that the interest in Nietzsche grows, the danger of misunderstanding grows" —that is, the danger that young Germans may actually accept what is anti-Nazi in Nietzsche as just as valid as what is pro-Nazi. Haertle therefore lists Nietzsche's "errors" very carefully, under headings such as "race," "the Jewish question," "state" and so on. But almost always he is able to explain the error, usually as an effect of the nineteenth-century environment.[24] Nietzsche saw many and great truths; but he saw them as from the midst of a swamp, the swamp of nineteenth-century liberalism and democracy, and inevitably the rising mists obscured his vision. When Nietzsche agrees with the Nazis, he is the prophet to whom is granted the true vision of things to come; when he disagrees with them, he is the mortal who cannot be expected to rise entirely above his environment.

There are variations on this explanation. Such, for instance, is the assertion, dear to Baeumler, that Nietzsche had to push his thoughts to paradoxical and violent extremes in order to make any impression on so stupid an age; that, for instance, he had to pretend to see some good things in the Jews and many bad things in organized anti-Semitism, in order to get any attention, and in order to shake his contemporaries out of their fatuous complacence over the second Reich. Baeumler even goes so far as to assert that, since so much of Nietzsche's published work is necessarily cut to fit the author's Machiavellian purposes in his warfare with the age, his unpublished work is therefore a more trustworthy index of what he really thought. Herr Baeumler has, accordingly, published and arranged Nietzsche's copious literary remains.[25] In this unpublished work of Nietzsche's, Baeumler discerns a perfect unity, and points out the way in which Nietzsche may ultimately be shown to be infallible. Baeumler, whose labors in the cause have won him a chair in the University of Berlin, is the leading expert in the exegetical study

[24] Haertle, *Nietzsche und der Nationalsozialismus,* especially Part I, "Einleitung."

[25] See the preface to Baeumler's edition, *Nietzsche, Die Unschuld des Werdens: Der Nachlass,* pp. ix–xl.

of Nietzsche. He does not, unfortunately, possess any of the Master's grace and vigor of style. In fact, his German is heavier and more lumbering than is usual even in the learned world. He has, however, great determination in dialectic, and a lack of humor which in many ways makes up for a lack of finesse.

Baeumler's method is best shown by specific examples. He does, it is true, proceed on the blanket assumption outlined above—that Nietzsche's work is perfectly consistent and perfectly Nazi, and that where it seems to conflict with the party doctrine we have either misinterpreted the Master, or misunderstood his immediate purpose in the conflict he waged single-handed against an age steeped in liberal and democratic error. Baeumler's point-by-point analysis is, however, his really great achievement. Nietzsche, for instance, wrote a great deal that seems on the surface to be the kind of individualism, even anarchism, popular with the superior aesthetic souls of the late nineteenth century. Nietzsche has even, by unenlightened critics, been coupled with Max Stirner, the author of *The Ego and Its Own*. Certainly one of the things Mr. H. L. Mencken and Mr. G. B. Shaw found to admire in Nietzsche was this insistence that really strong men are not to be tied down to any sentimental identification of themselves with the state, or with society, or with any other group composed largely of stupid men. Now in the Nazi state, individualism, anarchism, distrust of the state, are forbidden doctrines. Baeumler feels that he has to show that Nietzsche *under proper conditions* would have identified himself as whole-heartedly with the state as does any good brownshirt. When Nietzsche says he scorns the state, Baeumler glosses, he is thinking of the second Reich. The second Reich was a state based on the defeat and subordination of the German people by Roman and Christian elements. It was based on nearly two thousand years of corruption. Nietzsche rightly hated this romanized Teutonic (*deutsch*) state, and when he writes that he is "unpolitical" he means he is unpolitical in such a state. Similarly, whenever he says cruel things about the Germans, he is thinking of these romanized and christianized Germans. But Nietzsche always admired the basic German (*germanisch*) qualities of virility, joy, simplicity, strength, and so on. Were there on earth a state *germanisch* instead of *deutsch*, Nietzsche would at once submit himself gratefully to such a state. There is now such a state, the third Reich, and Nietzsche is undoubtedly smiling down upon it from Valhalla. Baeumler then clinches his argument: Nietzsche

hated a Reich governed by a *Kaiser,* a bad Teutonic copy of the Roman Caesar; he would have loved a Reich governed by a head ineffably German, a *Führer.*[26]

We need hardly pursue Baeumler much further. No difficulty baffles him. Did Nietzsche call himself something that sounds like "freethinker," and does freethinker suggest to the uninitiated Voltaire, Tom Paine, and other clearly non-German writers? Mistake. "Not Latin freethinking (*lateinische Freigeisterei*) but Siegfried stands back of Nietzsche's attack on Christianity." Even when Nietzsche praises the Renaissance, he is praising nothing Latin. He is praising the fighting spirit of the period; moreover, the north and central Italians Nietzsche admired came of the nobility, and were "extremely probably" of German blood. Baeumler ends with a little prophetic flight of his own: "The German state of the future will not be a continuation of the work of Bismarck; it will rather be built out of the spirit of Nietzsche and the spirit of the Great War."[27]

* * * * *

One of Nietzsche's early essays was entitled "On the Use and Abuse of History." We may close this article with the question: Is what the Nazis are doing with Nietzsche use or abuse of the Master's work? Such a question is fair enough, but it is a hard one to answer fairly. The group we may call the "gentle" Nietzscheans—and a very devoted group it is—clearly believe that what men like Baeumler and Haertle are doing is a shocking perversion of Nietzsche's plain intent. One of them writes that Baeumler is attempting a "transvaluation of all Nietzsche" and comments bitterly on the endless chain of books and articles about him now appearing in Germany:

> An old game of the human imagination has begun. The past is called into the present, and there begins that ceremony of consultation, of seeking for authority, the end of which is already pretty clear, since the consultant and the consulted are substantially one. For this reason almost all current writing on Nietzsche has interest only as a part of our contemporary history, and one may say of it what Lichtenberg said of other books, "Such works are mirrors: when a monkey gapes into one, no apostle can look back out."[28]

[26] A. Baeumler, *Nietzsche der Philosoph und Politiker,* pp. 88–97.

[27] *Ibid.,* p. 103; p. 97; p. 183.

[28] A. Kesser, "Elemente zur Beurteilung Nietzsches," *Neue Schweizer Rundschau,* Vol. 4 (1936–37), p. 535. Note that this is a Swiss, not a German, periodical.

It is at any rate clearly a red-herring to bring up the problem as to whether, were he alive today, Nietzsche would accept Nazi rule as the embodiment of his ideas. This is an interesting psychological question, and one which a biographer of Nietzsche ought perhaps to face; but it is not an inevitable concern of the historian of ideas. We may hazard the guess that Nietzsche, who never got on with anyone here on earth, would not have got on with the Nazis. Nietzsche was a man of letters not merely vain and irritable, but with a sense of a personal prophetic mission never disciplined by any necessity for getting things done. No, we suspect that Nietzsche even today would still be crying out—from Switzerland or Italy—that man is a thing to be surpassed.

Nor is it altogether fair to attempt to weigh statistically the parts of Nietzsche's work that in their simplest interpretation support the Nazi position, and then balance them off against the parts that seem at odds with it. For one thing, Nietzsche's work rarely admits of a simple interpretation. For another, any such mechanical method of approach to the study of the influence of ideas misses all the subtle twists and turns by which ideas are adapted to their work on this earth. It is a fact that men like Heinrich Mann, Charles Andler, Henri Lichtenberger, William Salter, Bernard Shaw, Anthony Ludovici, H. L. Mencken and Willard Huntington Wright have considered themselves good Nietzscheans. Now, though these are men of various dispositions, who would not perhaps have got on very well if stranded together on a South Sea island, they are certainly not men to be very happy in Hitler's Germany. It is also a fact that the leaders of Hitler's Germany, including Hitler himself, consider themselves good Nietzscheans. Both sorts of men can cite chapter and verse from the work of the Master.

We ought, perhaps, to leave the matter there. Nevertheless, the historian must recognize that, point for point, Nietzsche preached (along with other things) most of the articles of the Nazi faith—a transvaluation of all values, the sanctity of the will to power, the right and duty of the strong to dominate, the sole right of great states to exist, and a renewing, a rebirth of German and European society. The historian must recognize also that, though many differing ethical values may be attached to the vague Nietzschean concept of the Superman, both the Nazi idea of the master-race and the *Führerprinzip* are among the most obvious and most congruous derivatives of that concept. He may well feel also, as the present

writer feels, a similarity in the general emotional tone (as distinct from specific ideas) of Nietzsche's writings and that of the utterances of the Nazi leaders. Nietzsche first, among philosophers, repudiated sharply and completely the underlying *ethos*, the "great tradition," of Western civilization; and what he preached, the leaders of National Socialism have converted into a potent organized propaganda and a program of collective action.

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ON ELIZABETHAN "CREDULITY"

WITH SOME QUESTIONS CONCERNING THE USE OF THE MARVELOUS IN LITERATURE

By Madeleine Doran

Although this paper is for the most part necessarily declarative in form, it is wholly interrogative in spirit. It is intended to raise questions both historical and critical. The historical question is concerned with Renaissance attitudes of mind towards marvels in the realm of natural history. The critical question follows from it: Given certain attitudes towards strange features of the world, how will these attitudes affect the response of reader and audience towards literature that makes reference to these wonders? An attempt will be made to assess the differences in the quality of response of Elizabethan and modern readers to such characteristic features of Elizabethan literature.

Elizabethan "unnatural natural history" has been the subject of many inquiries, but it is not at all in the patronizing spirit of the antiquarian collector of quaint lore that I wish to approach the subject. It is rather an attempt to recapture the spirit of the cultured and adult Elizabethan, who saw his world through his own eyes, not ours.

I

The lion, as all know, is a royal beast. The "greatnesse and roughnesse of his Necke betokeneth a magnanimious and liberall mind." He is so proud in his nature that he disdains to touch again food he has once left, so just that he proportions his revenge exactly to the injury done him—for a slight hurt only biting a little, not killing,—so grateful that he remembers every kindness done him (as in the case of Androcles), so merciful that, "except in extremitie of famine," he will spare a man prostrate in petition before him, so magnanimous that he kills only men and spares weak women and children. He never stoops to guile, but, fighting in the open, faces his enemy with a "scornfull grinning." In a word, he is the noblest

of all animals.[1] His shrewdness is shown by the manner in which he outwits the unicorn, one of the deadliest of his natural enemies. The unicorn is a fierce beast, untameable except by a virgin; his voice is horrible to hear, "strained aboue measure"; he is known, according to some authorities, but not to all, for his chastity; and on his head he bears a precious horn, the powder of which has the wonderful virtue "of dissoluing and speedy expelling of all venome or poison whatsoeuer."[2] The manner of combat between the lion and the unicorn is this:

> as soone as euer a Lyon seeth a Vnicorne, he runneth to a tree for succor, that so when the Vnicorne maketh force at him, hee may not onely auoide his horne, but also destroy him; for the Vnicorne in the swiftnesse of his course runneth against the tree, wherein his sharpe horne sticketh fast, then when the Lyon seeth the Vnicorne fastned by the horne without all danger, he fauleth vpon him and killeth him.[3]

The same method is adopted by hunters, but, one gathers, rarely with success. Topsell says that his horn "cannot be taken from the Beast being aliue, forasmuch as he canot possible [sic] be taken in any deceit."

Elizabethan natural history is largely composed of creatures like lions and unicorns. Like the unicorn, many beasts are fabulous; like the lion with no joints in his neck or the elephant with none in his legs, many of the real ones are unlike their modern descendants; and all, fabulous or real, from the courteous and devout elephant to the savage and hypocritically tearful crocodile, from the pious phoenix doing obsequies to its parent to the ill-meaning siren luring the unwary seaman to his undoing—all are, like the lion, possessed of human virtues and vices, and therefore have for mankind a lesson. Topsell suggests that God preserved the animals in the Ark

[1] The account given here is from Edward Topsell's *Historie of Foure-Footed Beastes* (London, 1607), pp. 456–487. If anyone thinks the modern lion has degenerated from the nobility of his Elizabethan ancestor, let him read Martin Johnson's *Safari* (New York, 1928), especially pp. 260–278; the keynote of the chapter is a statement quoted from a big game hunter: "The lion is a sportsman and a gentleman."

[2] On the unicorn, see Topsell, *Beasts*, pp. 711–721.

[3] *Ibid.*, p. 719. For numerous other examples, see G. Boas, *The Happy Beast*, especially Chap. V. *Cf.* also the incident of the unicorn and the jeweler in Chapman's *Bussy d'Ambois*, II, i, 117–23 in the edition by Frederick F. Boas, 1905.

"for that a man might gaine out of them much deuine knowledge, such as is imprinted in them by nature." He continues:[4]

> And for the knowledge of man, many and most excellent rules for publicke and priuate affaires, both for preseruing a good Conscience and auoiding an euill daunger, are gathered from Beasts: . . .
>
> Were not this a good perswasion against murder to see all beasts so to maintaine their natures, that they kill not their owne kind? Who is so vnnaturall and unthankefull to his parents, but by reading how the young *Storkes* and *Wood-peckers* do in their parents olde age feed and nourish them, will not repent, amend his folly, and bee more naturall? What man is so void of compassion, that hearing the bounty of the *Bone-breaker Birde* to the young *Eagles*, will not become more liberall? Where is there such a sluggard and drone, that considereth the labours, paines, and trauels of the Emmet, Little-bee, Field-mouse, Squirrel, and such other that will not learne for shame to be more industrious, and set his fingers to worke? Why should any man liuing fall to do euill against his Conscience, or at the temptation of the Deuill, seeing a Lyon will neuer yeeld: *Mori scit vinci nescit;* and seeing the little *Wren* doth fight with an *Eagle*, contending for Soueraignty? woulde it not make all men to reuerence a good King set ouer them by God? Seeing the Bees seeke out their King if he loose himselfe, and by a most sagacious smelling-sence, neuer cease till he be found out, and then beare him vpon their bodies if he be not able to fly, but if he die they all forsake him. And what King is not inuited to clemency, and dehorted from tyranny, seeing the king of Bees hath a sting, but neuer vseth the same?
>
> How great is the loue and faithfulnesse of Dogges, the meeknesse of Elephants, the modesty or shamefastnesse of the adulterous Lyonesse, the neatnesse and politure of the Cat and Peacocke, the iustice of the Bee which gathereth from all flowers that which serueth their turne, and yet destroyeth not the flower. The care of the *Nightingale* to make her voice plesant, the chastity of the Turtle, the Canonicall voice and watchfulnesse of a Cocke, and to conclude the vtility of a Sheepe: All these and ten thousand more I could recite, to shew what the knowledge of the nature of brutish creatures doth worke or teach the minds of men, . . .

This, then, is the animal world the Elizabethans knew. How credulous are we to call them for holding such a picture? There is a tendency to make and to remember handy generalizations about an age, and one of the most current is that the Elizabethans were a credulous people. In what follows I propose, first, to examine the validity of the term "credulity" as applied to naturalists like Conrad Gesner and John Caius; and secondly, to raise questions con-

[4] Topsell, *Beasts*, A4, A5.

cerning the bearing of scientific credulity or incredulity on the response of cultivated Elizabethans to the marvelous in their literature. I use "Elizabethan" to include the early Jacobean as well as the strictly Elizabethan period.

The natural historians occupy a middle position between, on the one hand, the best of the mathematicians and astronomers, and, on the other hand, the popular encyclopedists and the makers of epitomes or "varieties" of curious and interesting lore. Conrad Gesner, a Swiss, one of the principal naturalists of the sixteenth century, was both an encyclopedist in the medieval tradition and an observer in his own right. He looks in both directions; he represents the age both as it had been and as it was coming to be. And the same is for the most part true of English naturalists like Caius, Turner, Moffett, and Gerard. Gesner's zoological books were published in Latin in the fifties.[5] It is with Edward Topsell's translation of part of Gesner—*The History of Four-Footed Beasts,* 1607, and *The History of Serpents,* 1608, that I shall be chiefly concerned.[6] Since Topsell often varies from Gesner, I shall try to assign particular statements to their originator, but since the relationship is complicated, I do not claim always to be successful.[7] To analyze the defects of Elizabethan science is but to limp after Bacon. My concern, however, is not primarily with its fruitfulness or barrenness, with its potentialities, or lack of them, for further advance; nor is it with its merely curious differences from ours. It is rather with the state of mind of those who could find it acceptable and consider it science.[8]

The problem of truth is an urgent one for both Gesner and Topsell. In his second epistle to the reader, Gesner says,

[5] *Historia Animalium,* Zürich, 1551–58.

[6] *The Four-Footed Beasts* is taken from the *Hist. Anim.,* Lib. I: *De Quadrupedis Viviparis;* the *Serpents* is from Lib. V: *De Serpentium Natura,* and also from the *Historiae Insectorum Libellus, qui est de Scorpione,* Zürich, 1587. My references to *De Quadrupedis Viviparis* are from the Frankfurt edition of 1603.

[7] In his address "To the Learned Reader," Topsell says that he has had to change Gesner's words, method, form and matter in some things; for whereas Gesner had collected all that had ever been written on every beast in order to make a dictionary for the private use of learned men, he, Topsell, intended to show to every plain and honest man in his own vulgar tongue the wonderful works of God in every beast.

[8] On this whole question see Hardin Craig, *The Enchanted Glass,* (New York, 1936), Chap. III, esp. pp. 64–68.

Those things truely which I thought were false or any way absurd, I either altogether omitted them, or so placed as I may conuict them: or if at any time I haue not done it, it was either thorough lacke of knowledge, or for some other cause.[9]

He says he will always give the authority for his information, and he does not promise his own in all cases. Topsell, in his own separate preface, expresses a similar determination to keep to the truth when he is able to judge of it:

The second thing in this discourse which I haue promised to affirme, is the truth of the Hystory of Creatures, for the marke of a good writer is to follow truth and not deceiuable Fables. And in this kind I haue passed the straightest [*i.e.*, straitest?] passage, because the relation of most thinges in this Booke are taken out of Heathen writers, such as peraduenture are many times superstitiously credulous, and haue added of their owne verie many rash inuentions, without reason, authority, or probability, as if they had been hyred to sell such Fables.[10]

He declares that he has not related all that is said of these beasts, but only what is said by many, unless it is clear enough to need no more than a single testimony, or unless it has only one witness, in which case he attributes it to that authority, "not giuing the Reader any warant from me to beleeue it." In the text occurs this passage, typical of many:

in this and all other honest discourses of any part of Phylosophy, the onely marke wherat euerie good student and professor ought to ayme, must be veritie and not tales:[11]

and the statement is often repeated that we must not believe anything "against reason." Yet both Gesner and Topsell give credence to much of the traditional lore about strange creatures, and about the even stranger behavior of authentic beasts. There is clearly here a problem in mental attitude for us to try to comprehend. Since they think of themselves as regarding their knowledge rationally, since they are conscious of credulity in others and disclaim it in themselves, and since, most important of all, they accept cautiously or reject altogether things they consider strange, we have no right to convict them of gullibility on the mere difference of their

[9] Topsell, *Beasts*, ¶6^{r}–6^{v}; Gesner, *De Quad*, b^{r}.

[10] Topsell, *Beasts*, A5^{r}.

[11] *Ibid.*, p. 47.

beliefs from ours. We must attempt, first, to understand what to them is normal and what strange, in other words, what their standard of reasonable judgment is.

The differences between modern science and Renaissance science —or, more specifically, natural history—may for convenience be treated under three heads: body of data, process of verification, and frame of reference.

In the first place, modern science, partly through geographical exploration and partly through the aid of instruments extending the range of observation, has at its disposal a much larger collection of verified data. The point needs no elaboration, but it is worth noting that where a Renaissance scientist had opportunity for first-hand experience, he could be very accurate. Witness Gerard's meticulous descriptions of plants. His indignant denial of the legendary character of the mandrake is based on his own observation:[12]

> There haue been many ridiculous tales brought vp of this plant, whether of olde wiues or some runnagate surgeons or phisickmongers, I know not, (a title bad enough for them:) but sure some one or moe that sought to make themselues famous in skill full aboue others were the first brochers of that errour I spake of [*i.e.*, that the roots always resembled the legs of a man]. They adde further, that it is neuer or verie seldome to be founde growing naturally but vnder a gallows, where the matter that hath fallen from the dead bodie, hath giuen it the shape of a man: and the matter of a woman, the substaunce of a female plant; with many other such doltish dreames. They fable further and affirm, that he who woulde take vp a plant thereof must tie a dogge thereunto to pull it vp, which will giue a great shrike at the digging vp; otherwise if a man should do it, he should certainly die in short space after: besides many fables of louing matters, too full of scurrilitie to set foorth in print, which I forbeare to speak of: all which dreames and olde wiues tales, you shall from henceforth cast out of your bookes and memorie; knowing this that they are all and euery part of them false and most vntrue; For I my selfe and my seruaunts also haue digged vp, planted, and replanted verie many: & yet neuer could either perceiue shape of man or woman, but sometimes one straight roote, sometimes two, and often sixe or seauen braunches comming from the maine great roote; euen as nature list to bestowe vpon it as to other plants.

He says that idle drones have carved the roots of briony into the shapes of men and women, and that this practice has confirmed the

[12] *The Herball or General Historie of Plantes* (London, 1597), pp. 280–82. William Turner had made a similar denial in his *Herbal* ("lately ouersene, corrected and enlarged," Cologne, 1568), pp. 45^{v}–47.

error among simple and unlearned people, who take these roots to be the true mandrakes. As for the virtues of the plant,

> *Dioscorides* doth particularly set downe many faculties heere of, of which notwithstanding there be none proper vnto it, sauing those that depende vpon the drowsie and sleeping power thereof, which qualitie consisteth more in the roote then in any other part.

Witness also John Caius' account of English dogs, which has little in it, aside from a moral tale or two, of the marvelous. Notice his caution and yet his open-mindedness, a truly scientific attitude, with respect to the dog called Piscator or Fisher. He addresses Gesner on the subject:[13]

> The Dogge called the fisher, whereof Hector Boethus writeth, which seeketh for fishe by smelling among rockes & stones, assuredly, I knowe none of that kinde in England, neither haue I receaued by reporte that there is any suche, albeit I haue bene diligent & busie in demaunding the question as well of fishermen, as also of huntesmen in that behalfe being carefull and earnest to learne and vnderstand of them if any such were, except you hold opinion that the beauer or Otter is a fishe (as many haue beleeued) & according to their beliefe affirmed, and as the birde *Pupine*, is thought to be a fishe and so accounted. But that kinde of dogge which followeth the fishe to apprehend and take it (if there bee any of that disposition and property) whether they do this for the game of hunting, or for the heate of hunger, as other Dogges do. . . When I am fully resolued and disburthened of this doubt I wil send you certificate in writing.

However, knowledge of exotic animals and plants had to depend for the most part either on the accounts of the ancients or on travellers' tales. The European zoological collections appear to have been slenderly stocked, and the English one in the Tower, as described by travellers in the nineties, was a sorry affair: six lions and lionesses, two of them said to be over a hundred years old, and a lean, ugly wolf, supposed to be the only one in England.[14] About the same time a showman had an elephant for exhibition, and in

[13] *Of English Dogges . . . newly drawne into Englishe by Abraham Fleming* (London, 1576), p. 18. Fleming's translation appears in Arber's *English Garner* (London, 1895), Vol. III, pp. 225–68; also in *The Works of John Caius,* edited by E. S. Roberts, Cambridge University Press, 1912.

[14] See "Journal of the Duke of Würtemberg, 1602" translated in W. B. Rye, *England as Seen by Foreigners in the Days of Elizabeth and James the First* (London, 1865), pp. 19–20; also *Thomas Platter's Travels in England, 1599,* translated and edited by Clare Williams (London, 1937), p. 163.

1623 King James owned an elephant and a small herd of camels, which were put to graze in St. James's Park.[15] Apparently the first extensive collection in England of museum specimens for the study of natural history was that begun by John Tradescant in the later years of James I's reign.[16]

In the second place, the process of verification, as modern scientists understand it, was not widely understood. The question of authority may be considered here. Let us not too complacently throw stones at the Renaissance man for believing what Aristotle, Theophrastus, Dioscorides, Pliny, Aelian or Galen had said. We too believe what our scientists tell us—with unwavering faith. We must, of course, let the specialist's authority count for something, if we are to get on; each man cannot verify every truth of nature for himself, and it would be stupid of him to try. The true difference between our relation to authority and the Elizabethans' is not that we do not accept it and that they did, but that we accept it for the most part with better reason—or should I say, with more likelihood of its being well-founded, since the layman tends to accept it without much thought for the reason. Our scientific authorities are heirs to a meticulous and elaborate technique of verification, and we accept what they say because we suppose them (rightly or wrongly) to have applied this technique. For the Elizabethans, without an established technique of controlled experiment or a clear understanding of procedure by hypothesis and test, acceptance must often rest on the reputed wisdom and honesty of the authority who had made the report. Who could, then, doubt lightly what the wisest of the ancients had said? A faith in ordinary travellers' tales would be less excusable, but, in point of fact, we do not know how much credence these were given by educated people. Professor Chew, in his recent book on English travellers in Islam during the Renaissance, *The Crescent and the Rose*, collects a number of references from the late sixteenth and early seventeenth centuries showing mistrust of travellers' stories. The remark of Mercury in Jonson's *Cynthia's Revels* is a fair sample: a traveller "will lie cheaper than any beggar, and louder than most clocks."[17]

[15] See Jonson, *Every Man Out of his Humour*, IV, vi, 59–61 (Herford and Simpson's edition); Donne, *Satires*, i, 80–82; and Samuel Chew, *The Crescent and the Rose* (New York, 1937), pp. 18–19.

[16] On the Tradescants and their collection, see Chap. IX, "The Ashmolean Museum," in R. T. Gunther, *Early Science in Oxford*, Vol. III (Oxford, 1925).

[17] II, iii, 99–100.

Perhaps a growing critical sense is illustrated by the difference between the attitude towards Pliny of Gesner and Topsell and of Sir Thomas Browne. The older men do not hesitate to reject the authority of Pliny if they consider a modern report more trustworthy. As an instance, they reject the notion of the bear cub's being licked into shape (despite the authority of Pliny, Solinus, Aelian, Orus, Oppianus, and Ovid), for the truth is "most euidently otherwise, as by the eye witnes of *Ioachimus Rheticus* and other, is disproued."[18] Rheticus was a contemporary scientist who had some correspondence with Gesner. But the untrustworthiness of Pliny and the other authorities in this instance did not lead Gesner and Topsell to suspect their accuracy in general, or at least—for they do say that the ancients often fabled—it did not lead them to apply their suspicion actively to reports for which they had no modern denial. Sir Thomas Browne, however, devotes a whole chapter in the *Pseudodoxia Epidemica* to the relative trustworthiness of authorities, and he clearly sees that those who, like Pliny, were merely transcribing the reports of others, had no claim to authority in themselves. He calls Pliny "the greatest Collector or Rhapsodist of the Latines," and says,

> there is scarce a popular error passant in our days, which is not either directly expressed, or diductively contained in this Work; which being in the hands of most men, hath proved a powerful occasion of their propagation. Wherein notwithstanding the credulity of the Reader is more condemnable than the curiosity of the Author: for commonly he nameth the Authors from whom he received those accounts, and writes but as he reads, as in his Preface to Vespasian he acknowledgeth.[19]

Verification would also rest for the Elizabethan on experience, if not often on purposive experiment. Why should a man doubt the existence of a unicorn if he could see, and even handle, its horn? In 1599 Thomas Platter, a Swiss traveller, saw two in England, one in the collection of treasures at Hampton Court, and one, which he was told had been sent to Henry VIII from Arabia, in a similar collection at Windsor. The one at Hampton Court had been filed down to obtain medicinal powder. The one at Windsor weighed twenty pounds and was one foot taller than Platter; he could almost com-

[18] Topsell, *Beasts*, p. 37; Gesner, *De Quad.*, p. 944.

[19] Book I, chap. viii. In the *Works*, edited by Geoffrey Keynes (London 1928), Vol. II, pp. 59–60.

pass its circumference with one thumb and forefinger. At a Mr. Cope's collection of exotic objects in London, he saw, not a unicorn's horn, but a unicorn's tail.[20] Gesner inquired very carefully into reports of unicorns' horns and made a census of those extant; he says that in Europe there were "twenty of these hornes pure, and so many broken."[21] Of most of them he gives detailed descriptions, some in the form of letters he had received in reply to inquiries. One in Poland was found along with a skeleton of great bones, "bigger in quantity than a horse."[22] Unlike most of the horns, which were as tall as a man, straight, and "wreathed about with diuers sphires,"[23] this one was smooth and curved almost to half a circle. His informant argues that those found in Poland could hardly come from elephants, since they were never found in pairs, but always single.

Somewhat later, the visitor to London might have seen in Tradescant's Ark in the South Lambeth Road, along with hundreds of other curiosities, the following wonders: a griffin's beak or head, "Barnacles, four sorts" (meaning, of course, barnacle geese, since they are listed under birds), "A natural Dragon, above two inches long," a monoceros' horn, a sea-horse's head and teeth, a remora, the hand of a mermaid, and "Two feathers of the Phoenix tayle." All of these but the mermaid's hand appear in the catalogue made by the younger Tradescant in 1656, before the collection passed into the hands of Elias Ashmole, and became the foundation of the Ashmolean Museum at Oxford. As late as 1675, there was exhibited among other rarities in the Anatomy School at Oxford a siren's hand; a catalogue of 1709 lists a sea-horse's head, a unicorn's horn, and the thigh bone of a giant.[24] Tradescant's sea-horse's head, for that matter, may still be seen in the Ashmolean collection at Oxford. It is in reality the skull of a walrus.[25]

It is obvious from the naming of these fragments that the Elizabethans had achieved no reliable system of classification. This brings us to a consideration of the third point of difference between

[20] Platter, pp. 171 *ff.*, 204–205, 215.

[21] Topsell, *Beasts*, p. 716; Gesner, *De Quad.*, p. 694.

[22] Topsell, p. 717; Gesner, p. 695.

[23] Topsell, p. 715; Gesner, p. 691—"rectum & spiris contortum."

[24] For the account of the Tradescant collection in 1634, see Gunther, III, 283–284; for the catalogue of 1656, see Appendix A in the same volume; for catalogues of the Anatomy School collections, pp. 252–279.

[25] Photograph in Gunther, III, opposite p. 344; described on p. 346.

Renaissance and modern science, and that is the matter of the frame of reference. What does Topsell mean when he says we must believe nothing "against reason"? What were his rational standards of judgment, apart from experience and authority?

We believe, rationally enough, in many things we have never ourselves sensuously perceived as fact. We have a basis of judgment in things directly known and we admit as possible things not directly experienced but reported by others if they violate no principle to which the world more directly known to us seems to conform. Extensive labors of careful scientific observation over a long period of time have given us a large and highly articulated equipment of facts and principles to use as criteria of probability. In biology, for instance, the detailed classification of living forms and the evolutionary conception of their relationships have permeated, even if in vague ways, the knowledge of the man of ordinary education, sufficiently to make him consider a satyr, a dragon, or a griffin, as described by Gesner, impossible monstrosities. But the modern classification of living forms on the basis of structure and function showed only faint beginnings in the sixteenth century; it is principally the work of Linnaeus and his successors in the eighteenth. The finer points of Aristotle's classification appear to have been lost sight of or were not well enough understood to be applied; enough examples of hesitating or arbitrary classification from Gesner or Caius could be assembled to show that most natural scientists of the Renaissance had in mind no very clear principles.[26] One suspects that the concept of the final cause and the ethical view of nature, the latter a heritage of Plato and the Neoplatonists, fostered through centuries of allegorical application in fable, *exemplum,* and emblem, had replaced physical principles as the standard of judgment about what is probably to be found in the natural world.

The ethical view of nature has been illustrated in the account I have given of the lion and the unicorn, and may be found in any book of natural history one chooses to examine. A pleasant example is Thomas Moffett's treatise in ottava rima on *The Silkewormes, and their Flies* (1599), wherein he asserts that of all creatures the silk-fly, pure white in color, faithful to one mate, and in the worm stage hard-working and simple in its diet, has the least degenerated, through the fall of our first parents, from its original blessed con-

[26] See the quotation from Caius already given, where he is not sure that the beaver and the otter may not be fish.

dition. Another example is Charles Butler's *Feminine Monarchie* (1609),[27] which, together with the most detailed observations on the appearance, habits, and care of bees, has plenty to say of their industry, their sagacity, their skill, and their loyalty to prince and commonwealth. The principle of the final cause is well illustrated in the excerpt I have given from Topsell's preface. Compare also this passage from Bartholomew:

> Also beasts are ordained, not onelye for meate of the bodye, but also for remedie of euills, and also for many manner of medicines. All kinds of beastes, wilde and tame, going and creeping, is made and ordayned for the best vse of mankinde, as *Plinius* and *Iohn Damascenus* meaneth. But some beastes are ordained for mans meate, as Sheepe, Harts, and other such: and some serue for the seruice of mankinde, as Horses, Asses, Oxen and Camells, & other such: and some for mans mirth, as Apes, Marmosets, and Popiniayes: and some be made for exercitation of man, for man should know his own infirmitie, and the might of God, and therefore are made flyes and lice: and Lyons and Tygers and Beares be made, that man may by the first know his owne infirmitie, and be afeard of the second, and haue succour by calling of Gods name. Also some beasts are made to releeue & helpe the neede of many maner infirmityes of mankinde, as y^e^ flesh of y^e^ adder *Vipera* to make Triacle . . .[28]

Bacon saw that science would be at a stay until it threw overboard final causes:

> For to say . . . that the clouds are for watering of the earth; or that the solidness of the earth is for the station and mansion of living creatures and the like, is well inquired and collected in metaphysique, but in physique they are impertinent. Nay, they are indeed but *remorae* and hindrances to stay and slug the ship from further sailing, and have brought this to pass, that the search for physical causes hath been neglected and passed in silence.[29]

If you had found a use for a beast, then you had found its place in the world, and need inquire no further into the matter. Without any clear concept of species, or accurate knowledge of the process

[27] Yet Butler makes a special disclaimer of repeating fables; the sub-title of his book is *A Treatise concerning Bees, and the Due Ordering of Them: Wherein the truth, found out by experience and diligent observation, discovereth the idle and fond conceipts, which many have written anent this subject.*

[28] *Batman vppon Bartholeme, his Booke De Proprietatibus Rerum* (London, 1582), p. 338.

[29] *The Advancement of Learning,* Everyman's Library edition, p. 97.

of generation and of the workings of heredity, there is no reason why an Elizabethan should have found anything inherently incredible in the griffin with its lion's body and its eagle's head and wings, in the satyr with its human or apelike trunk and goat's legs, or in any such monstrous combination. On the basis of structure and habit alone, we ought ourselves to find the penguin, the whale, the bat, and the duck-billed platypus incredible, but evolutionary principles of relationship and adaptation provide for us a sufficient explanation. So far as a creature like the unicorn is concerned, it is not at all less probable, even on modern standards of structure, than the antlered hart, the trunked elephant, or the humped camel. For myself, I find the unicorn much less improbable than the giraffe.

But all this is negative. The Elizabethans had certain positive principles of reference by which they could judge of the probability of things not known at first hand. One is the principle of sympathies and antipathies. It is basic to the medieval and Renaissance pharmacopœia; and it underlies such expressions as "for every ill there is a remedy," "like cures like," a certain animal hates another "by kind":

> . . . for God in nature hath likewise ordained some bodies, whereby the Scorpion should be, and is dryuen away, scarred [sic], and destroyed.
>
> First of all therefore men, which are the cheefe, and head of all liuing creatures, do by naturall instinct, kill and destroy Scorpions, and therefore *Galen* wryteth thus, Let vs (saith he) kill Scorpions, Spyders and Vipers, not because they are euill in themselues, but because it is ingrafted in vs by nature, to loue that which is good vnto vs, but to hate and auert from that which is euill vnto vs, *Non considerantes genitum ne ita sit an secus,* not considering whether it were so bred or not.[30]

If the universe operated on a system of secret attractions and repulsions, as it seemed from observation to do, what was improbable in the curing of warts by the wart-stone? in the breeding of scorpions in the brain of a man who smells basil, since the herb itself when crushed corrupts into scorpions? Or what unlikely in the serpent's avoiding the shadow of the ash-tree, naturally deadly to him? in the lion's fear of the crowing cock? in the elephant's terror of the voice of swine? in the loadstone's loss of virtue when rubbed with garlic? in the taming of a wild bull by tying him to a fig tree, or of a wild ox by putting a halter of wool about his neck? As with the pro-

[30] Topsell, *Serpents,* p. 227; Gesner, *De Scorpione.*

verbial method of catching birds, there would be some difficulty in putting the latter experiments to the proof.

An allied principle is that of analogy. In the sea there is a beast correspondent to every one on land; man is a little image of the great world, and so on. Topsell's position with regard to the "buffe" (*Tarandos*), a Scythian ruminant of some sort, will serve not only to illustrate this principle, but also to show the author's deliberation before giving credit to a report on the face of it improbable. The buffe is reported by Pliny and others to change his hue when he is frightened to match his surroundings, becoming green among green boughs, like rocks among rocks, and so forth. Topsell agrees that the report seems incredible, but he is led to subscribe to it by two considerations: first, by analogy with the effect of emotion on the countenance of men—

> because we see that the face of men and beasts thorough feare, ioy, anger, and other passions, doe quickly change; from ruddy to white, from blacke to pale, and from pale to ruddy againe. Now as this beast hath the head of a Hart, so also hath it the feare of a Hart, but in a higher degree; and therefore by secret operation it may easily alter the colour of their haire, as a passion in a reasonable man, may alter the colour of his face;

and second, by analogy with the polypus-fish and the chameleon, which change color with their surroundings. To the objection that unlike these creatures the buffe has hair and that it is impossible for the hair to receive any tincture from the passions, Topsell answers that nature can multiply and diminish her power, and that if she can make the feathers of birds and the scales of fishes of different colors, she "may and doth as forcibly worke in the haires of a *buffe*, as in the skinne of a *Chamæleon;* adding so much more force to transmute them, by how much farther off they stand from the blood."[31] His acceptance of the reported phenomenon has been made on entirely rational grounds in accordance with his principles respecting the operation of nature.

Besides the principles of sympathy and antipathy, besides his own analogous experience, the Elizabethan scientist has also, for reference, the myths and fables of the ancients. These his Christian doctrine, if nothing else, forbids him to accept literally. But he treats them as if they had allegorical reference to actual facts of

[31] Topsell, *Beasts*, pp. 55–57; see Gesner, *De Quad.*, pp. 140–141, but he merely states the report and the objections without arguing the matter.

experience, and therefore, if one but pierces the fable, one has credible evidence of the truth. Gesner's treatment of the satyr is a case in point.[32] One view he takes of it is that it is a real animal, a kind of rarely seen ape, that has occasioned men to think it a devil; and poets, painters, and the rest have therefore described it with horns on its head and feet like goats, "whereas Satires haue neither of both." He treats them at length, their countries, their habits, and stories concerning them. In like manner the Sphinx or Sphinga is classified as an ape and described according to Pliny and Calisthius. An elaborate naturalistic explanation is then given of the Greek story of the riddle of the Sphinx.

When we attempt to account for the monsters believed in by former ages—the Elizabethan, for instance—do we not say that they probably often had a basis in fact, but that they assumed strange shapes and habits under the influence of imagination? Tradescant's walrus' skull, for instance, was metamorphosed into the skull of a sea-horse. How does Topsell's approach to the strange creatures of myth differ in this respect from ours except, on his part, in a far less trustworthy body of knowledge and principle to which to refer the marvelous for comparison?

A further point of reference for the Elizabethan scientist is the active presence of supernatural beings in the world. For instance, although Topsell thinks with Gesner that what are generally called satyrs are apes, he says it may be that devils have appeared to men in the likeness of satyrs as they have in other forms.

> It is certaine, that the deuils do many waies delude men in the likenes of the Satyres, for when the drunken feasts of *Baccus* were yearly celebrated in *Parnassus*, there were many sightes of Satyres, and voyces, and sounding of cymbals heard.[33]

Once grant the possibility of the active agency of the supernatural, and the bases of credibility, as we know them, are radically changed. The Scriptures alone made it clear that the presence in man's world of supernatural beings was not only possible, but actual. Did not Satan appear to Eve in the likeness of a serpent?[34] The realm of

[32] Topsell, *Beasts*, pp. 12–15; Gesner, *De Quad.*, p. 862 *ff.*

[33] Topsell, *Beasts*, p. 14; see Gesner, *De Quad.*, p. 863, but he appears to have no statement quite like this.

[34] But the literal truth of *Genesis*, iii, 1–6, 13–15, was sometimes questioned. See, for instance, John Deacon's and John Walker's *Dialogicall Discourses of Spirits*

the monstrous therefore remained open in a way in which it does not to most of us and belief might range, with apparent reason, over an enormously wider area.

Scriptural warrant went, of course, for things natural as well as things supernatural. Because of the ninety-first Psalm, *Super Aspidem et Basiliscum ambulabis,* it was impossible for Sir Thomas Browne to deny the existence in Biblical times of the basilisk; he could only deny its monstrous modern relative, the cockatrice, "a Hieroglyphicall fansie," as he calls it, quite different from the ancient basilisk, which he holds to have been a proper kind of serpent.[35] And Topsell's argument for the existence of the unicorn is impregnably buttressed by the ninety-second Psalm, the thirty-ninth chapter of Job, and many other Scriptural references. Topsell waxes indignant over those who, despite abundant proof, doubt the existence of the unicorn because of the too-wonderful powers of his horn:

> Now our discourse of the Vnicorne is of none of these beasts, for there is not any vertue attributed to their hornes [rhinoceros, the fish Monoceros, one-horned kine, rams, birds, etc.], and therefore the vulgar sort of infidell people which scarcely beleeue any hearbe but such as they see in their owne Gardens, or any beast but such as is in their own flocks, or any knowledge but such as is bred in their owne braines, or any birds which are not hatched in their owne Nests, haue neuer made question of these, but of the true Vnicorne, whereof ther were more proofes in the world, because of the noblenesse of his horn, they haue euer bin in doubt: by which distraction, it appeareth vnto me that there is some secret enemy in the inward degenerate nature of man, which continually blindeth the eies of God his people, from beholding and beleeuing the greatnesse of God his workes.[36]

It is what seems possible in a given world that is credible. Modern science, working outwards from within, has developed its laws hand in hand with observation; they form an evolving and

and Divels (London, 1601), pp. 107–117, where, in a controversy over some notorious modern cases of alleged demoniac possession, they deny Satan's power to assume a material body; they interpret the Scriptural passage in two not clearly reconciled ways: (1) that "serpent" is to be understood in a purely metaphorical sense as applying to Satan, not to the beast, and (2) that Satan merely induced the actual serpent to speak, without being in his body.

[35] *Pseudodoxia Epidemica,* Book III, chap. vii; Keynes' edition, Vol. II, pp. 199–204.

[36] Topsell, *Beasts,* p. 712; no corresponding passage in Gesner.

adjustable structure. It has learned to put its faith in the solid core of verified brute fact rather than in the envelope of provisional principle.[37] Principle always remains strictly relevant to fact, because both are treated from the same physical point of view; hence what is possible is limited with a definiteness it could not have been for the Elizabethans. Renaissance science, on the other hand, in so far as it was medieval and not looking towards modern ways, suffered from lack of relevance between fact and theory. Within a rigid enclosing framework of theological, metaphysical, and moral principles, it was inaccurate and confused in detail. Whatever apparently physical principles there were, such as sympathy, antipathy, analogy, were largely magical in character, although perhaps not recognized as such. The possible was therefore limited only by man's ingenuity in finding an explanation for a reported phenomenon in some generally irrelevant principle. The latitude was wide.

II

When we come to consider the bearings of all this on Elizabethan literature, we enter on highly speculative ground. I am making the tentative assumption (by analogy with modern times) that the educated Elizabethan would have somewhat the same attitude towards fact and marvel, if not the same technical knowledge, as the scientist—at least as the scientist whose work, like Gesner's or Turner's or Gerard's, was available in English and somewhat popular in presentation. We may, for instance, consider Raleigh, although he had perhaps too much special interest in science to be a typical example. With reference to theological wonder and miracle, he is often thought of as skeptical, in his own day as atheistical. Yet in the midst of his sober and accurately recorded experiences in Guiana, we find him giving credence to a report of a race of men like Othello's, with heads beneath their shoulders. He accepts them because of the number of witnesses both Indian and Spanish to their existence.[38]

[37] *Cf.* William James's interesting comment in *The Will to Believe* (in *The Will to Believe and Other Essays in Popular Philosophy*, New York, 1897, p. 21) on science's "so-called method of verification": "she has fallen so deeply in love with the method that one may even say she has ceased to care for truth by itself at all. It is only truth as technically verified that interests her. The truth of truths might come in merely affirmative form, and she would decline to touch it."

[38] *The Discoverie of the Large, Rich, and Bewtiful Empyre of Guiana* (London, 1596), pp. 69–71.

Next unto *Arui* there are two riuers *Atoica* and *Caora,* and on that braunch which is called *Caora* are a nation of people, whose heades appeare not aboue their shoulders, which though it may be thought a meere fable, yet for mine owne part I am resolued it is true, because euery child in the prouinces of *Arromaia* and *Canuri* affirme the same. They are called *Ewaipanoma:* they are reported to haue their eyes in their shoulders, and their mouths in the middle of their breasts, & that a long train of haire groweth backward betwen their shoulders. The sonne of *Topiawari,* which I brought with mee into England, tolde mee that they are the most mightie men of all the lande, and vse bowes, arrowes, and clubs thrice as bigge as any of *Guiana,* or of the *Orenoqueponi,* and that one of the *Iwarawakeri* tooke a prisoner of them the yeare before our arriual there, and brought him into the borders of *Arromaia,* his fathers Countrey. And farther when I seemed to doubt of it, hee tolde me that it was no wonder among them, but that they were as great a nation, and as common, as any other in all the prouinces, and had of late years slaine manie hundreds of his fathers people, and of other nations their neighbors, but it was not my chaunce to heare of them til I was come away, and if I had but spoken one word of it while I was there I might haue brought one of them with me to put the matter out of doubt. Such a nation was written of by Maundeuile, whose reports were held for fables many yeares,—and yet since the East *Indies* were discouered, wee finde his relations true of such thinges as heeretofore were helde incredible: whether it be true or no the matter is not greate, neither can there be any profit in the imagination, for mine own part I saw them not, but I am resolued that so many people did not all combine, or forethinke to make the report.

When he came to Cumana in the West Indies, a Spaniard who had been in the interior up the Orinoco told him he had seen many of these creatures. The last sentence in the paragraph quoted is the significant one. Like Gesner and Topsell in so many things, Raleigh has a suspicion of the fabulous, but like them, on credible witness he gives in.

The validity of the premise that the attitude of educated men would be conditioned by the scientists of the day is suggested by a number of recent studies of Elizabethan learning, such as Professor Hardin Craig's *Enchanted Glass,*[39] Louis B. Wright's *Middle-Class Culture in Elizabethan England,*[40] Francis Johnson's *Astronomical Thought in Renaissance England;*[41] and other studies, such as Mr.

[39] New York: Oxford University Press, 1936.

[40] Chapel Hill: University of North Carolina Press, 1935.

[41] Baltimore: Johns Hopkins Press, 1937. For a somewhat later period, see Professor Marjorie Nicolson's series of studies on the effect of the telescope and the

Oliver Willard is making on the circulation of Elizabethan books, will enable us to evaluate the assumption further. For the moment, let us make it, and see what follows for our present purpose, or rather, what questions it raises.

Shakespeare's plays have many meanings: to make an oversimplified statement, they had a meaning for him himself; they have a meaning for us as members of our own age, and another as separate individuals; they had a meaning to his own audience, and a different meaning to different cultural levels of his audience. I wish to consider the meaning of one element in Elizabethan literature, and on one level—that is, the meaning to the educated Elizabethan of the use of the marvelous in the literature of his own day. And I have seen a way of approaching it by means of the scientists themselves, since, in order for us, as moderns, to entertain imaginatively the Elizabethan's response to this element in his literature, we must first of all see the phenomenal world through his eyes, so far as that is possible, instead of through our eyes; and to do so means knowing what for him would be fact and what marvel.

The marvelous is always out on the periphery of knowledge. As Joyce's old man in *The Portrait of the Artist as a Young Man* says, "Ah, there must be terrible queer creatures at the latter end of the world." Perhaps one difference between the Renaissance and the modern world is that that periphery, at least as regards natural history, was for them spatial, whereas for us it is largely temporal. Strange creatures inhabited for them the fringes of the known world: it is the far-travelled Othello who talks of "Anthropophagi, and men whose heads do grow beneath their shoulders"; it is Ortelius' map of Iceland that bears the most monsters. Modern exploration has not only covered the entire earth with a fine net; it has brought back photographic testimony for all the rest of us to see. We are given a chance to make personal verification. Perhaps that is why the marvelous, for us, has largely receded from the realms of natural history (except as shown in circus side-shows); it still occupies the heavens for many people (not merely the believer in astrology, but the reader of Eddington and Jeans), and for still more it occupies the occult realm of psychic phenomena. In the

microscope on the literary imagination: *Mod. Phil.*, XXXII (1935), 233–260; *Studies in Phil.*, XXXII (1935), 428–462; *Jour. Engl. Lit. Hist.*, II (1935), 1–32; *Smith College Studies in Mod. Lang.*, Vol. XVI, No. 4 (July, 1935), and Vol. XVII, No. 2 (Jan., 1936).

realm of natural history, it is chiefly the past and the future that have held, and may hold, the wonderful. The remote geologic past, with its monstrous and now extinct creatures, holds for us, despite scientific warrant for their actual existence (or perhaps because of it), the wonder which is the authentic mark of the marvelous. The future suggests possibilities, through the very advance of scientific knowledge, which may make biological forms, including man, very different from what they are now; a book such as Huxley's *Brave New World* gives us the genuine experience of the marvelous because its picture of the world is both strange and seemingly possible —hence terrible.

The distinguishing feature of the marvelous would seem to arise, then, not from the failure of conformity to actual fact of the marvelous thing; the marvelous is not simply something not true which is believed in. It is the unaccountable thing which *may* be true, and sometimes is (as in the case of visions and of biological monstrosities). In so far as one gives it any degree of belief, one feels in some degree the fear and the wonder that the unaccountable gives.

I suggest, tentatively, that one may distinguish three levels of response to the marvelous.

(1) The highest level is complete acceptance. This is not the same in effect as the acceptance of commonplace facts, since the facts are marvelous "facts." The phenomena are thought extraordinary or supernatural, and yet for some reason demand assent. For many, but not necessarily all, of Shakespeare's audience, ghosts and witches would have been in this category. For some modern people, as I have already suggested, the "facts" of contemporary science are marvelous on this level. An authentic thrill comes to many from the thought of the great interstellar spaces of the modern astronomer's universe; to some it comes from the "mysteries" of the chemist's or physicist's laboratory or of a radio receiving set.

(2) The second, or intermediate level, is the entertainment of the possibility without actual belief; it often arises from a conflict between a rational attitude of scepticism and an emotional willingness to believe. This is the attitude today of many "enlightened" people towards psychic phenomena such as telepathy, or towards common superstitions. Often a humorous entertainment of such ideas, or indulgence in such practices, meant to imply disbelief, really masks a willingness to believe, or at least a troubling capacity

to be moved by a sense of their possibility or efficacy. This is the attitude of people who laugh when they knock on wood or comment on a black cat's crossing the path. For some in Shakespeare's audience, ghosts would have been in this category instead of in the first; many of the stranger features of natural history, if we may judge by scientists' awareness of their being called in question, would have been here.

(3) The third level is the complete rejection of the potential actuality of the phenomenon in question, yet a willingness for reasons of convention or of symbolism to entertain the fiction imaginatively. One might use in this connection Coleridge's term of "negative faith."[42] Clearly, this state of mind not only applies to references to the contemporaneous marvelous, which may be accepted by one element of readers or audience, and rejected by others except on this imaginative level; but also, and especially, it applies to references to the marvelous of a past age—for the Elizabethans, particularly to classical mythology; for us, to classical myth of course, and to Biblical myth, but also to medieval and Elizabethan myth, whether found in the literature of those times or employed again in ours. The unicorn, for instance, is a beast that dies hard. For centuries the use of classical mythology in poetry has depended on this sort of response. The higher the literary culture of the audience, the more effective the use of the marvelous in this purely literary sense will be; whereas on the other two levels, the less literate education, at least of a speculative kind, the better.

The possibility of response to Elizabethan literature on the first, and perhaps even the second level, has for most of us, I imagine, disappeared. Instead, our response to the outmoded features of the Elizabethan world is generally of two kinds: either we accept them seriously for the time being, as we do the ghost in *Hamlet,* with a conventional suspension of disbelief,[43] or we smile at their "quaintness," as we are likely to do at Ulysses' elephant, which "hath joints, but none for courtesy" and whose "legs are legs for neces-

[42] *Biographia Literaria,* Everyman's Library edition, p. 242.

[43] The response of Sir Oliver Lodge or Sir Arthur Conan Doyle would perhaps have been compounded of the first and third levels—belief in the supernatural *possibility* of a spirit's communication with his son along with purely literary acceptance of Shakespeare's *method* of exhibiting it. Perhaps I under-estimate the number of modern people who are moved by the ghost in *Hamlet* on the first or second level.

sity, not for flexure.''[44] But for the Elizabethan, there was possibility of response on all three levels, and this, I think, would have given his own contemporary literature a richness of texture of a certain sort that is lost to us.

But first we need to exclude what would be for him the merely factual, non-marvelous things that are no longer facts for us, and hence are likely to seem naïve or amusing. It is not easy for us to know just what these were, or at just what time hitherto accepted facts would be moving, for different cultural levels, into the realm of myth. This is where the historian of science can help us, and a more searching examination than I have made should reveal much. It seems clear, for instance, that the general idea of spontaneous generation—of bees from the putrifying flesh of oxen, hornets from horses, fleas from dust, moths from cloth, toads from earth, snails from rain, and so on—was entertained as a purely factual notion; it had ordinarily no more coloring of the marvelous about it than any other little understood operation of nature. ''Rottenness and putrefaction is the mother of many creatures and herbs.''[45] But when Antony and Lepidus discuss, along with the pyramids and the nature of the crocodile, the peculiar property of Nile mud—

> Your serpent of Egypt is bred now of your mud by the operation of your sun: so is your crocodile—[46]

we catch the note of wonder at a strange thing in a strange land.

Our specific question, then, is at which of these three levels the response of a cultivated Elizabethan would be to a given literary instance of the marvelous. The ghosts in *Hamlet* and *Macbeth* and the witches in *Macbeth* are the classic cases. It is in the realm of astrology and the supernatural that the matter of belief is most crucial, because phenomena from these realms may be used dramatically, as actual characters, or as motive forces. The ghost in *Hamlet* not only appears on the stage, but also precipitates the entire tragic crisis in the mind of Hamlet; the stars in *Romeo and Juliet* are not merely evocative stage-setting for the balcony scenes, they are an inauspicious fate, to fear, to defy, and to submit to. The frequency with which astrological and supernatural phenomena occur in Elizabethan drama suggests that the dramatists expected a re-

[44] *Troilus and Cressida*, II, iii, 113–115 in the Globe edition.

[45] Topsell, *Beasts*.

[46] *Antony and Cleopatra*, II, vii, 29–31.

sponse on the first or second level, that is, the level of complete belief, or the level of emotional willingness to entertain belief. From those of us who must respond to *Hamlet* and *Macbeth* entirely on the third level, the level of mere suspension of our normal disbelief, something of the full horror of these plays must always be withheld.

The realm of plant and animal lore which we have been examining appears in literature abundantly enough, but for the most part only in metaphor. The question is at once raised whether, regardless of his state of belief or disbelief, a reader or spectator would be conscious in response to mere metaphor of the qualitative differences I have been describing. I cannot answer the question. But I shall make a few suggestions which may lead to partial answers.

The prominence of the metaphor might have some significance in this respect, and, if it did, our question would have more importance for lyric than for dramatic poetry, where metaphor is less centrally placed for attention. I am not sure, however, that the quality of such a poem as Shakespeare's *Phoenix and the Turtle* is greatly different if we believe in the phoenix, if we desire to believe in it, or if we disbelieve in it, since the idea of perfect love, not the phoenix itself, is the important thing.

> So between them love did shine,
> That the turtle saw his right
> Flaming in the phoenix' sight:
> Either was the other's mine.

On the other hand, for the understanding of Donne's "Go and catch a falling star," it does matter in what state of belief we are in with regard to mandrakes or mermaids, for if we believe in them too thoroughly we shall miss the point of the poem, that a constant woman is as strange as they.

Shakespeare sometimes gives the question of belief in strange creatures prominence in dramatic poetry, but in the instances I have noticed he does so by means of direct reference, not by means of metaphor. In *The Tempest,* for instance, where he wishes the audience to give assent to the strange occurrences on the island, he makes Sebastian say:

> Now I will believe
> That there are unicorns; that in Arabia
> There is one tree, the phoenix' throne; one phoenix
> At this hour reigning there.

And Antonio replies,

> I'll believe both;
> And what does else want credit, come to me,
> And I'll be sworn 'tis true; travellers ne'er did lie,
> Though fools at home condemn them.[47]

The technique is effective. It is a technique for moving disbelievers from the third to the second level, from mere imaginative to emotional assent. The wavering of faith might well have been convinced, and the skeptics moved to doubt their skepticism.

Another point to make, one that I have already suggested, is that a number of references to phenomena on different levels of a reader's or spectator's belief, even though they were not called into conscious focus, might have given a piece of literature a value for a contemporary quite lost to us, for whom response is generally all on one level. What I have in mind may be illustrated from the *Faerie Queene*. There, of course, the whole poem may be taken as a metaphor. For the most part its strange creatures are frankly imaginative creations and would have been understood as such by the educated readers of the poem. But the creatures that Guyon meets in his voyage to the Bower of Bliss are not in the same category with the serpent Error or the Blatant Beast.

> Eftsoones they saw an hideous hoast arrayd,
> Of huge Sea monsters, such as liuing sence dismayed.
>
> Most ugly shapes, and horrible aspects,
> Such as Dame Nature selfe mote feare to see,
> Or shame, that euer should so fowle defects
> From her most cunning hand escaped bee;
> All dreadfull pourtraicts of deformitiee:
> Spring-headed *Hydres*, and sea-shouldring Whales,
> Great whirlpooles, which all fishes make to flee,
> Bright Scolopendraes, arm'd with siluer scales,
> Mighty *Monoceroses*, with immeasured tayles.
>
> The dreadful Fish, that hath deseru'd the name
> Of Death, and like him lookes in dreadfull hew,
> The griesly Wasserman, that makes his game
> The flying ships with swiftnesse to pursew,
> The horrible Sea-satyre, that doth shew
> His fearefull face in time of greatest storme,

[47] III, iii, 21–27.

Huge *Ziffius,* whom Mariners eschew
No lesse then rockes, (as trauellers informe,)
And greedy *Rosmarines* with visages deforme.

All these, and thousand thousands many more,
And more deformed Monsters thousand fold,
With dreadfull noise, and hollow rombling rore,
Came rushing in the fomy waues enrold,
Which seem'd to fly for feare them to behold:
Ne wonder, if these did the knight appall;
For all that here on earth we dreadfull hold,
Be but as bugs to fearen babes withall,
Compared to the creatures in the seas entrall.[48]

These are not Spenser's own imaginative fictions. They are the beasts and fishes described by Olaus Magnus,[49] the strange inhabitants of the northern seas, drawings of some of which Spenser's readers might have seen on Ortelius' map of Iceland.[50] In an unpublished paper to which the author has given me permission to refer, Professor Merritt Hughes makes the point that Spenser's moral purpose here is to show the danger of giving free rein to the imagination. The point seems to me a sound one. From that point of view it makes no difference, perhaps, whether the animals are real or fictional; in any case they run a monstrous riot in the mind. But if we regard the effect of the passage from the aesthetic rather than from the moral point of view, it seems to me to be significant that these are the creatures of the book of travel and the geography and not of the poet's mind. For us, since the names are mostly unfamiliar, they are probably the same in effect as if they were purely fanciful; they are just more of Spenser's monsters. But for

[48] II, xii, 22–25.

[49] *Historia de Gentibus Septentrionalibus,* Rome, 1555.

[50] *Theatrum Orbis Terrarum* (Antwerp, [1595]), fol. 103; also in English translation, *The Theatre of the Whole World* (London, 1606), fol. 103. The letterpress contains a description of the animals drawn on the map: various kinds of whales, a *Hyena* or sea-hog, sea-cows (drawn pretty much like cows), sea-horses (with manes, webbed fore-feet, fish-tails), a *Rosmarus* (walrus; the description says he goes on the bottom of the sea on four feet, and that he sleeps twelve hours together by hanging by his teeth from a rock), a *Ziphius* (description says a sword-fish, *Xiphius,* may be intended, but the drawing is of a round-headed creature, with no sword-like snout), and a huge creature like a ray or skate.

The Latin editions of 1570, 1603, and 1624 contain no separate map of Iceland and no such account of marine monsters.

the Elizabethan they would not have been the same; they were "the queer creatures at the latter end of the world" that might or might not exist, and hence this passage would have given him a sensation of the marvelous on the first or second level, unlike the merely negative faith with which he would be entertaining the other fictions of the poem. The impact of the lines would be very different from that of many other, and to us equally fictional, passages.

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THE DEVELOPMENT OF SCIENTIFIC METHOD IN THE SCHOOL OF PADUA

By John Herman Randall, Jr.

The Aristotelian science which the thirteenth century had so eagerly worked into its Christian philosophy of life aimed at an understanding of nature divorced from power over things. But during the sixteenth century more and more men began to hold that science should be directed, not merely to understanding and vision, but to a kind of understanding that might give power, action, and an improvement of the practical arts. A leading intellectual enterprise of the time was the search for a fruitful method that could serve this new aim to which knowledge was turning. Those thinkers whose energies were not wholly absorbed by the theological issues in terms of which the major battles were still being fought, concentrated on this problem of method as the paramount scientific task of the day.

Ironically enough, when the fruitful method was finally "discovered" and proved in practice, it turned out to be the least novel of all the elements that went into the formation of the new science. After exploring many a blind alley, men came to realize that one of the great medieval intellectual traditions had already made an excellent beginning at just the kind of practical and useful knowledge they now wanted. In the thirteenth and fourteenth century schools, there had been worked out the idea of an experimentally grounded and mathematically formulated science of nature, and since then much had been done in the way of actual achievement. In Leonardo the penetrating, in the Italian mathematicians and physicists of the sixteenth century, in Copernicus, Kepler, and Galileo, such a science had indeed come of age.

Into this science there entered many different strands, each with its own history. And the powerful stimulus imparted during the sixteenth century by the recovery of the techniques of the Greek mathematicians is not to be minimized. But the conception of the nature of science, of its relation to the observation of fact, and of the method by which it might be achieved and formulated, that was handed on to his successors by Galileo, was not the work of the new seekers after a fruitful method. It appears rather as the culmination of the coöperative efforts of ten generations of scientists inquir-

ing into methodological problems in the universities of northern Italy. For three centuries the natural philosophers of the school of Padua, in fruitful commerce with the physicians of its medical faculty, devoted themselves to criticizing and expanding this conception and method, and to grounding it firmly in the careful analysis of experience. It left their hands with a refinement and precision of statement which the seventeenth century scientists who used it did not surpass in all their careful investigation of method.

In contrast with this cumulative and organized elaboration of the theory and method of science, the many humanist seekers, revolting from the scholasticism of the Scotists with their technical "terminist" logic, seem to have displayed all the customary ignorance and futility of intellectual revolutionaries, and to have proposed new methods distinguished chiefly by the novelty of their ignorance. As might be expected, these servants of the word for the most part sought their new method in language and in rhetoric, and tried to erect a "natural dialectic" on the basis of Cicero and Quintilian. Others like Bruno were fascinated by the suggestions of Lully for a universal language that might reveal all truth. And still others, emphasizing the place of a knowledge of nature in human wisdom, urged men to close their books and observe the world.

The humanists might seek the method of a new science in the rhetorician's art of persuasion; a Vives or a Bacon, recognizing no useful knowledge in the investigations of the mathematicians and astronomers of their day, might counsel experience and ever more experience. Their combined onslaught helped to shake men's faith in the complacent academic traditionalism of the schools, already sorely disturbed by the new literary and theological movements; it hardly contributed much guidance to those already busily engaged upon scientific problems. Both in its traditional insights and in its novel guesses the imagination needed the discipline of a critical method before there could be any significant observation of facts. The body of ideas which in Galileo and Descartes dared to arrogate to itself the name of natural science, and which in Newton definitively made good that proud claim, had other and far deeper roots, stretching back through and beyond the twelfth-century European appropriation of ancient learning.

History has fallen into error in accepting uncritically the estimate the pioneer thinkers of the sixteenth and seventeenth century made of their own turning away from the heritage of the past. Their

consciousness of fresh discovery and radical reorientation obscured the countless bonds of continuity, in materials, methods, and even achievements, uniting them to their predecessors in the late middle ages. In particular the fact that the seventeenth century scientists, in revolt against the humanists' appeal to the authority of the past, preferred to put their trust in "natural reason" alone, and hence cared nothing for historical continuity, has sadly misled our judgment as to the fashion in which their thought was generated. Taking them at their own word, we have assumed that that coöperative criticism and reconstruction of a well-organized system of ideas, shaken from time to time by fresh insights which have had to be worked into the logical structure—that that process which has since the seventeenth century been so characteristic of the procedure of scientific advance, played no part in its earlier stages.

In the present generation much has been brought to light about the organized scientific traditions of the later middle ages in which the sixteenth and seventeenth century pioneers carried on their work. But much more remains to be done. In particular, the fact that several of the most influential investigators have been French has focused attention on the activities of the University of Paris, while the further fact that many of them have been Catholic scholars has made them not unduly appreciative of the work of the free-thinking and anti-clerical Italian schools. For its part, Italian scholarship has been attracted by the spectacular humanistic movement and by the presumably more novel and original literary Platonism of the Florentines. As a result, though it is clear that the thought of the Italian universities forms the immediate background of the sixteenth-century scientific movement that culminated in Galileo, its substantial achievement has as yet received almost no study.

The basic idea of an experimentally grounded science of the mathematical structure of nature appeared as soon as Europeans began to explore the wisdom of the ancients. It developed within the general framework of the first body of ancient materials to be assimilated, the Augustinian philosophy of reason—itself the platonized outcome of Hellenistic thought. It drew specifically upon the Arabic versions of Alexandrian science, though direct contact with the whole of Greek mathematics, astronomy, and mechanics was the last to be established; Archimedes was not known till the sixteenth century. But the idea of such a science, and much of its method and concepts, were in the possession of Europeans from the twelfth century on.

Aristotle's logic, his theory of science and method, was discovered in the *Analytics* during the first half of the twelfth century; his basic concepts and principles of natural science were learned from the *Physics* in the second half. The coming of Aristole introduced a body of materials too impressive to be ignored. Thereafter for centuries the Aristotelian physical writings were taken as the starting-point for all natural science, however far men might eventually depart from them; and the Aristotelian theory of science, however men might interpret it, remained dominant till the time of Newton. From the beginning of the fourteenth century, however, there set in a persistent and searching reconstruction of the Aristotelian tradition, which, when directed to the *Physics*, led by gradual stages to the mechanical and mathematical problems of the Galilean age, and when directed to the *Logic* led to the precise formulation of the method and structure of science acclaimed by all the seventeenth-century scientists.

There were two main critical movements during the later middle ages. The Ockhamites began in Oxford in the thirteenth century, and while persisting there found a new stronghold during the next hundred years in the Faculty of Arts at Paris. The Latin Averroists began in Paris in the thirteenth century, and shifted their seat to Padua early in the fourteenth. Both set out by expressing a secular and anti-clerical spirit, and by undertaking a destructive criticism of Thomism and Scotism, the thirteenth century syntheses of science and religion. But both soon advanced beyond mere criticism to the constructive elaboration of natural science: they became the two great scientific schools of the later middle ages. The original work of the Ockhamites belongs to the fourteenth century, that of the Paduans, to the fifteenth and sixteenth. The former was done in dynamics, kinematics, and the logic of continuity and intensity; the latter, in methodology and in the further development of dynamics. Both turned from the earlier religious syntheses to the purely natural philosophy of Aristotle himself; and both developed primarily by a constructive criticism of the Aristotelian texts and doctrines. The Ockhamites were at first the more "progressive" and "modern"; they were interested in the free development of the Aristotelian physics, and their works take the form of questions and problems suggested by Aristotle's analyses. The Averroists, though much more secular and anti-clerical, were originally more conservative in their attitude toward Aristotle and his interpreter Averroes: their

works are characteristically commentaries on the texts. From 1400 on, however, they knew and taught all the Ockhamite departures from Aristotelian doctrine: Paul of Venice (*1429) is remarkably up-to-date, and his *Summa Naturalis* contains an exposition of all the ideas of the dynamics of the Paris Ockhamites and the Oxford logicians. The works of these fourteenth-century thinkers were printed in many editions so soon as the press reached Italy, all of them by 1490; and in the sixteenth century it was primarily the Italians who advanced by successive stages to the formulations of Galileo.

About 1400, therefore, the interest in the development of scientific ideas shifts from Ockhamite Paris to the Padua Averroists. From the time of Paul of Venice to Cremonini (*1631) the Aristotelian physics and a nascent "Galilean" physics were in definite and conscious opposition at Padua, and this critical conflict contributed greatly to the working out of the latter. Paul of Venice had been sent by his order to Oxford in 1390, where he remained for three years; he then taught for two more in Paris at the time of the last great Ockhamite, Pierre d'Ailly. He thus knew all the Ockhamite developments at first hand, and explained them fully though critically in his encyclopedic writings.

His successor at Padua, Cajetan of Thiene (*1465), was the most radical scientifically of the Averroists, and the most sympathetic to the Paris teachings on dynamics. He initiated a great controversy over the *Calculations* of Suisseth (Swineshead), in which all the arguments for a mathematical as against a qualitative physics are examined, so that the documents of this controversy, in many editions, were among the first works printed in Italy in the 1480's. The fundamental *De latitudinibus formarum* of Nicholas of Oresme, in which the rule for uniformly accelerated motion first appears, came out in 1482, with a discussion by Blasius de Parma de Pelicanis; Albert of Saxony's *Tractatus de proportionibus,* arguing for a quantitative treatment of qualities (already reported in the *Summa Naturalis* of Paul of Venice) also appeared in the same year; in 1496 it was reprinted with the *De intensione et remissione formarum* of Walter Burleigh, a defense of the logic of qualitative change opposed to the spirit of Oresme, and with a full reply to Burleigh in behalf of quantitative analysis by the physician Jacopo da Forlì. Among the most interesting of all these documents, indicative of a lively concern with what was to become the fundamental scientific question, is the

Tractatus de proportionibus of a Milanese physician, Johannes Marlianus (Pavia, 1482), which brings experimental proof to bear on the quantitative side, describes the rolling of balls down an inclined plane to measure their velocity and acceleration, and narrates experiments with pendulums.

The question whether the operation of causes was to be formulated mathematically or qualitatively (whether the "first accident" of substance was to be taken as quantity or not—which happens to be also the way in which Kepler expressed his view that a cause is a mathematical law) was thus vigorously debated at Padua toward the end of the fifteenth century, and the notion of "cause" as a mathematically formulated formal cause won many adherents. In the next century there broke out another great controversy among the Paduans as to whether the "cause" of natural motion was to be sought in a form or in a force, that is, in a definite way of behaving or in something that acted in a definite way. Galileo joined those who identified "cause" with a "force"; but since he also defined force in terms of its way of acting, his divergence was not great. And towards the end of the same century there occurred another dispute, as to whether final causes had any place in natural philosophy. The outcome of these successive debates was to delimit the conception of cause, and to make the Galilean position inevitable. They are here mentioned to suggest certain other strands in the development of Italian Aristotelianism which this study does not presume to set forth in detail, and which in particular illuminate the change from a qualitative to a mathematical treatment of natural operations.

It has become a recent fashion to view the whole "Renaissance," and indeed the very "birth" of modern science itself, as philosophically a turning from the Aristotle of the Schools to Platonism; and Italian thought of the fifteenth century has been represented as dominated by that turning. But it must not be forgotten that the vigorous intellectual life of the Italian universities remained loyal to the Aristotelian tradition. Now in most countries the fifteenth century saw the teaching and refinement of the earlier philosophies, Scotism, Thomism, and Ockhamism, with little basically new. But in northern Italy, at Padua, Bologna, and Pavia, and to a lesser extent at Siena, Pisa, and the brilliant new university of Ferrara, Aristotelianism was still a living and growing body of ideas. What Paris had been in the thirteenth century, what Oxford and Paris together had been in the fourteenth, Padua became in the fifteenth: the center in

which ideas from all Europe were combined into an organized and cumulative body of knowledge. A succession of great teachers carried that knowledge to the point where in the next century it could find fruitful marriage with the new interest in the mathematical sciences. In the Italian schools alone the emerging science of nature did not mean a sharp break with reigning theological interests. To them it came rather as the natural outcome of a sustained and cooperative criticism of Aristotelian ideas. If in the sixteenth century the more original minds were led to a formal break with the Paduan teaching, we must not forget that even Galileo occupied a chair there from 1592 to 1610, and that in method and philosophy if not in physics he remained a typical Paduan Aristotelian.

That Italian Aristotelianism was thus able to lead the European schools in the fifteenth and sixteenth centuries was due to several circumstances, not the least of which was the settled commercial prosperity the Italian cities had now achieved. They had long enjoyed and taught in their universities a thoroughly secular and anticlerical philosophy expressive of the new culture of a this-worldly and commercial society. By 1400 that nice blend of Aristotelian science and Christian faith which Thomas and Duns Scotus had constructed had, in Italy at least, retreated into the monastic orders. At Padua, Bologna, and Pavia there reigned an Aristotelianism that made little attempt to accommodate itself to theological interests. And it is no accident that while the Church-controlled science of the North drove all those who felt the new currents into open rebellion against science itself, the anti-clerical science of the Italian universities could progress steadily in self-criticism to the achievement of a Galileo.

Fundamental also was the close alliance between the study of Aristotle and the study of medicine. At Paris the Faculty of Theology crowned the Sorbonne; at Padua the Faculty of Arts led only to that of Medicine, and Aristotle was there taught as a preparation, not for an ecclesiastical career, but for the study of medicine, with a consequent strong emphasis on his physical writings, his natural history, and his scientific methodology. A physician's Aristotle is bound to differ from a theologian's. The teachers wrote no theological works, no commentaries on the *Sentences*. They normally held medical degrees themselves; they applied Aristotle to medical problems, and to questions of method arising in medical science; they interpreted him in the light of the best medical writers of the Greek and Arabic traditions.

Finally, the liberty of teaching and speculation guaranteed by Venice, the leading Italian anti-papal and anti-clerical state, after its acquisition of Padua in 1404, attracted the best minds from all over Italy, especially the philosophical Southerners. Padua remained to the days of Galileo the leading scientific school of Europe, the stronghold of the Aristotelian qualitative physics, and the trainer even of those who were to break with it. Cusanus, Purbach, Regiomontanus, Copernicus, as well as the Italians, all studied at Padua.

If the concepts of a mathematical physics were arrived at by a long criticism of Aristotelian ideas, the "new method," the logic and methodology taken over and expressed by Galileo and destined to become the scientific method of the seventeenth century physicists, as contrasted with the many noisy proposals of the sixteenth century "buccinators" down to Francis Bacon, was even more clearly the result of a fruitful critical reconstruction of the Aristotelian theory of science, undertaken at Padua in particular, and fertilized by the methodological discussions of the commentators on the medical writers. For three hundred years, after Pietro d'Abano brought the problems to the fore, the Paduan medical teachers were driven by their texts, especially Galen, to a careful analysis of scientific procedure. The great commentators on Galen, Jacopo da Forlì (*1413), who incidentally wrote widely on the methods of the Paris physicists, and Hugo of Siena (*1439), gradually built up a detailed theory of scientific method which the Aristotelian scholars, themselves holders of medical degrees, incorporated into their version of the nature of science. It is possible to trace step by step in rather beautiful fashion the gradual elaboration of the Aristotelian method, in the light of the medical tradition, from its first discussion in Pietro d'Abano to its completed statement in the logical controversies of Zabarella, in which it reaches the form familiar in Galileo and the seventeenth-century scientists.

This discussion of method was carried on in terms of the general formal structure of science and its relation to the subject-matter in which it is to be discovered and exemplified. As such it is applicable equally to all four of the Aristotelian kinds of cause; and hence it does not insist, any more than the extensive discussions of the seventeenth century, that the principles of natural science be strictly mathematical in character and that its formal structure be stated in mathematical terms. This mathematical emphasis is an important element in Galilean science. It too has a long and gradual develop-

ment at Padua in the fifteenth and sixteenth centuries, as has been already indicated; and these discussions involve both the Oxford logic of quantity and the issues it raised, and the recovery of Greek mathematical texts and techniques in the sixteenth century. But this seems to be another part of the story, best told in connection with the particular treatment of particular natural questions. It would involve a different set of Aristotelian texts and problems, and a wholly different group of passages; it seems best to present the development of methodological theory in its own terms, and to postpone this other important strand.

These men were concerned with the discovery and use of "principles" in science. Like all thinkers from the twelfth century to Newton, they understood *principium* as Aristotle understood ἀρχή, as that from which a thing proceeds and has its origin in any way whatever; specifically, in science a *principium* is that which is in any way a source of understanding. The particular character of "priority" and origin, of which both Aristotle and the scientific theory deriving from him distinguished various kinds, depends upon the specific character and context of the problem under consideration. The distinctions between the different kinds of order and method, therefore, running through all the men here considered, are *ipso facto* distinctions between different kinds of "priority," that is, between different meanings of *principium*.

The question of method was raised, and the terms in which it was to be treated for three centuries were clearly formulated, by Pietro d'Abano in his *Conciliator differentiarum philosophorum, et praecipue medicorum*, written in 1310. In discussing the question whether medicine is a science he points out that "science" is used in two senses.

> Science in the most proper sense is that which infers the conclusion through causes which are proximate and immediate, like that science defined in *Analytica Posteriora*, L. I, c. 2 [71b]; "We think that we know a thing unqualifiedly (*simpliciter*) and not in a sophistical and accidental manner, when we think we know the cause on account of which (*propter quam*) the fact exists, that it is the cause of that fact, and that it could not be otherwise"; and this kind of science is gained from "demonstration *propter quid*" (demonstration *wherefore* or *why*) or what Galen called "*doctrina compositiva*" (the compositive way of teaching). There is a second sense of science that is also proper, and indeed can be said to be for us most proper; since for us the natural way is to proceed from what is more knowable and certain

for us to what is more knowable in the order of nature: see the beginning of the *Physica* [184a]. When, in cases where effects inhere in their causes according to an essential order of priority, we arrive by the opposite order at the cause we are seeking, through proximate and logically immediate middle terms; or when we conclude an effect from more general causes, omitting certain intermediate causes, we acquire knowledge by "demonstration *quia*" (demonstration *that*) or what is called "*doctrina resolutiva*" (the resolutive way of teaching).[1]

Pietro is here making his central distinction between two kinds of science and demonstration in terms of the theory of science developed in the *Posterior Analytics.* Science is defined as a demonstrative knowledge of things through their causes; its instrument is the demonstrative syllogism, which establishes the relations between causes and their effects.[2] The problem of forming such syllogisms is the problem of discovering causes and defining them in such a way that they can serve as the middle terms of demonstrations.[3] Pietro is thus distinguishing between two kinds of *proof:* that of effects through causes, and that of causes through effects.

The transformation of the demonstrative proof of causes into a method of discovery is precisely the achievement of the Paduan theory of science. That change of context is already suggested, in the above passage, in Pietro's identification of the two kinds of demonstration with the various ways of teaching, or *doctrina,* and

[1] *Op. cit.,* Diff. 3, Prop. 1; (ed. Venice 1496). The two forms of "demonstration *quia*" here distinguished refer to *An. Post.* I, c. 13, where Aristotle is contrasting scientific knowledge of *the wherefore* (τὸ διότι) with scientific knowledge of *the that* (τὸ ὅτι). The first form is illustrated by the proof, What does not twinkle is near, the planets do not twinkle, they are therefore near. "This syllogism proves not 'the wherefore' but only 'the that'; since they are not near because they do not twinkle, but because they are near they do not twinkle." (*An. Post.* 78a.) The corresponding demonstration *propter quid,* following the causal order rather than our "natural way" of discovering the cause, makes the cause, "nearness," the middle term: the planets are near, hence they do not twinkle. The other form of "demonstration *quia*" is the one where the middle term is more general than major or minor, and does not exhibit the proximate cause. Aristotle's illustration is, What can breathe is an animal, no wall is an animal, therefore no wall can breathe.

[2] *An. Post.* 71b.

[3] "In all our inquiries we are asking whether there is a middle term or what the middle term is: for the middle is precisely the cause, and it is the cause we are seeking in all our inquiries. Thus, does the moon suffer eclipse? means, is there or is there not a cause producing eclipse of the moon? and when we have learnt that there is, our next question is, what then is this cause?" (*An. Post.* 90a)

of *order* or dependence. These terms are drawn from other sources than Aristotle, and they bring with them an interest that is methodological as well as purely logical. Pietro treats them at length in Difference 8. The *Tegni* (*Techne*) or art of medicine of Galen commences with a prologue in which three *doctrinae* or ways of teaching medical science are distinguished: by *resolution*, by *composition*, and by *definition*.

> In all the ways of teaching (*doctrinae*) which follow a definite order there are three orders of procedure. One of them is that which follows the way of conversion and *resolution* (*dissolutio*); in it you set up in your mind the thing at which you are aiming, and of which you are seeking a scientific knowledge, as the end to be satisfied. Then you examine what lies nearest to it, and nearest to that without which the thing cannot exist; nor are you finished till you arrive at the principle which satisfies it. . . . The second follows the way of *composition*, and is the contrary of the first way. In it you begin with the thing at which you have arrived by the way of resolution, and then return to the very things resolved, and put them together again (*compone eas*) in their proper order, until you arrive at the last of them. . . . And the third follows the way of analysing the definition.[4]

The first two *doctrinae* had been identified by the Arabic commentator on Galen, Hali ('Ali ben 'Abbas, *994), with the two Aristotelian kinds of demonstration, that which proceeds from effects to causes, demonstration *quia* (ὅτι), and that which proceeds from causes to effects, demonstration *propter quid* (διότι).[5] This division, however, was naturally confused with the threefold distinction made by Averroes in the *Prohemium* to his commentary on Aristotle's *Physica*, into demonstration *simpliciter*, or *of cause and being*,

[4] *Galieni principis medicorum Microtegni cum commento Hali*, translated from the Arabic by Constantinus Africanus; no date or place of printing, but prior to 1479; Texts I, II, III, IV.

[5] *Ibidem*, Hali's comment on Text III: "Demonstrations are carried out in these two *doctrinae;* but demonstration *quare* is effected by composition, and demonstration *quia* by resolution (*dissolutio*)." *Cf. Conciliator*, Diff. 8, Introd.: "As Hali says, the compositive way is effected by demonstration *propter quid*, the resolutive by demonstration *quia;* only these two kinds of demonstration are to be assumed." The Aristotelian source of the distinction is given as *An. Post.* II, 1 (89b); Pietro explains it: "It is written in the beginning of the second book of the *Posterior Analytics:* that the kinds of question we ask are as many as the kinds of thing which we know. For we know only what we have already asked about. And the kinds of question we ask are four: two simple, whether a thing is, and what it is; and two composite, namely, *that* (*quia*) it is, and *wherefore* (*propter quid*) or *why* (*quare*) it is." (*Conciliator*, Diff. 8, Prop. 3, ii.)

in which as in mathematics the causes are first both for us and for the order of nature; demonstration *propter quid*, or *of cause*, in which, as in natural science, we start with what is first in nature but not first for us; and demonstration *of being*, or *of sign*, in which we start with effects to arrive at causes.[6] The distinction between the two procedures, that from effects to causes and that from causes to effects, is thus Aristotelian. Averroes set the procedure of mathematics off from the *a priori* procedure of demonstration in physics; from Galen, and also from the rhetorical method of Cicero and Boethius,[7] came the terms *resolutive* and *compositive* to designate these two procedures.

For Pietro, this distinction of *doctrinae* still remained a distinction between two kinds of science, of which the first, or compositive, was alone science in the strictest sense; the second or resolutive was science only because of "the weakness of the human mind," which in natural science has to start with experienced effects to discover their causes or reasons why (*propter quid*). There are really but two kinds of demonstration, for the *a priori* method of mathematics and that of physics are but two species of the one kind, demonstration *propter quid*.

The physician Jacopo da Forlì (*1413), who occupied in turn the chairs of medicine and of natural philosophy at Padua, followed Hali and Pietro in their distinction between the two *doctrinae*, compositive and resolutive.[8] He added, however, a further analysis of

[6] "Averroes says that there are three kinds of demonstration: demonstration *simpliciter*, or *causae et esse;* demonstration *causae* or *propter quid;* and demonstration *esse* or *significati* . . . Demonstration *simpliciter* occurs when cause and effect are equally known, which happens in mathematics, but rarely occurs in natural science. Whence the Commentator [Averroes] says in the beginning of the *Physics:* 'If it happens that what is known to us is known by nature, then the demonstrations in this science will be *of cause and being.* If it happens that the things known to us are not known by nature, and are not prior in being but posterior, then the demonstrations in that science will be *of signs* (*signorum*) and not demonstrations *simpliciter.* For in natural science the things known to us are not those that are known *simpliciter*, that is, by nature; the contrary obtains in mathematics. The things that are known in the latter science *simpliciter*, and are causes prior in being, are known to us.'" (*Conciliator*, Diff. 8, Introd., Prop. IV.)

[7] "Likewise Cicero and Boethius in their *Topics* divided the power of definition into two parts: one dealing with judgment, which is subdivided into *resolutive* and *compositive.*" (*Conciliator*, Diff. 8, Introd.)

[8] "By *doctrina* Haly understands the manner, way, or path by which the teacher proceeds in teaching the pupil, either resolutive, compositive or definitive." (*Jacobi de Forlivio super Tegni Galeni*, Padua, 1475; comm. Text I.)

the method of resolution which brings it closer to a procedure of investigation.

Resolution is twofold, natural or real, and logical. Real resolution, though taken improperly in many senses, is strictly the separation and division of a thing into its component parts. Logical resolution is so called metaphorically. The metaphor is derived in this fashion: just as when something composite is resolved, the parts are separated from each other so that each is left by itself in its simple being, so also when a logical resolution is made, a thing at first understood confusedly is understood distinctly, so that the parts and causes touching its essence are distinctly grasped. Thus if when you have a fever you first grasp the concept of fever, you understand the fever in general and confusedly. You then *resolve* the fever into its causes, since any fever comes either from the heating of the humor or of the spirits or of the members; and again the heating of the humor is either of the blood or of the phlegm, etc.; until you arrive at the specific and distinct cause and knowledge of that fever.[9]

This is a clear case of the method of medical diagnosis; Jacopo illustrates most of his distinctions with a number of examples drawn from medicine. The methodological sense of the traditional terms seems to have crystallized in his usage.[10]

Hugo of Siena (*1439), teacher of medicine at Padua, Ferrara, and Parma, is still more concerned with methodology. Starting with Galen, he defines *doctrina* as the setting forth of what is demonstrable (*manifestatio demonstrabilis*);[11] it has two modes, resolution and composition, and in a complete science like physics or medicine it is impossible to use only one method; both are required,

[9] *Ibid.*, comm. Text I.

[10] "By the way of resolution we are to understand demonstration *quia*, that is, the knowledge of an effect proceeding to a knowledge of its causes; and conversely, by the way of composition we are to understand demonstration *propter quid*. The first is from the 'notion,' that is, from the knowledge of the end, that is, of the effect. This comes from the 'dissolution,' that is, from the resolution of the effect into its causes. The second way comes from the composition of what has been discovered, that is, of the causes discovered by resolution. For those things that are discovered by resolution in demonstration *quia* are afterwards put and joined together in a demonstration *propter quid*, until we arrive at the immediate cause, and conclude the effect. This exposition is approved by the Conciliator, Diff. 8, and by Gentilis, and by other moderns since them." (*Ibid.*, comm. Text I.)

[11] "As all demonstration is either through a cause or through an effect, *doctrina*, which is the setting forth of what is demonstrable, can be carried on only in one of these two modes, that is, by resolution or by composition." (*Expositio Ugonis Senensis super libros Tegni Galieni*, Venice, 1498; comm. Text I.)

. . . because in the knowledge of causes we use demonstration *quia,* and in the scientific knowledge of effects we use demonstration *propter quid.* It is the common opinion that both of these procedures are necessary, as well as the explanation of many definitions.[12]

A proper scientific method will begin with the effects, seek the cause, and then explain the effects from which it started by that cause.

In the discovery of the middle term or cause we proceed from effect to cause. . . . Such a way of acquiring knowledge we call resolutive, because in that discovery we proceed from an effect, which is commonly more composite, to a cause which is simpler; and because by this discovery of the cause we certify the effect through the cause, we say that demonstration *propter quid* and *of cause* is the foundation of resolutive knowledge. . . . But I myself see in the discovery of a science of effects through their cause a double form of procedure, and likewise in the discovery of a scientific knowledge of causes through their effects. The one procedure is the discovery of the middle term or cause, the other is the setting forth of its consequences or effects. And the process of discovery in the case of demonstration through causes is resolutive, while that of setting forth the consequences is compositive. In demonstration through effects it is just the other way around.[13]

Thus Hugo refuses to separate the two procedures: in any science and in any demonstration, discovery or *inventio* and setting forth the consequences or *notificatio* both enter as successive phases of the method to be employed. Discovery and proof are both essential moments in all method.

This notion of a "double process" in scientific method had already been set forth by Urban the Averroist in his large commentary on the *Physics* in 1334. Following Averroes, he distinguishes three modes of demonstration: the demonstration *simpliciter* of mathematics, in which the principles do not have to be sought after; demonstration *of sign,* proceeding from observed effects, by which the physicist learns the causes of natural things; and a third kind,

demonstrations which proceed from causes which, though they are always prior and more known *quoad naturam,* are often posterior and less known to us. This occurs in natural science, in which from those things prior for us, whose modes are effects, we investigate their causes, which are posterior and less known to us. And this is the way of the method of resolution.

[12] *Ibid.,* comm. Text I.

[13] *Ibid.,* comm. Text I.

But after we have investigated the causes, we demonstrate the effects through those causes; and this is the way of the method of composition. Thus physical demonstrations follow after mathematical demonstrations in certainty, because they are the most certain after those in mathematics.[14]

Paul of Venice (*1429) examines still more closely this double procedure in physical demonstrations, defending it against the charge of being what Aristotle called a circular proof.

Scientific knowledge of the cause depends on a knowledge of the effect, just as scientific knowledge of the effect depends on a knowledge of the cause, since we know the cause through the effect before we know the effect through the cause. This is the principal rule in all investigation, that a scientific knowledge of natural effects demands a prior knowledge of their causes and principles.—This is not a circle, however:—In scientific procedure there are three kinds of knowledge. The first is of the effect without any reasoning, called *quia*, that it is. The second is of the cause through knowledge of that effect; it is likewise called *quia*. The third is of the effect through the cause; it is called *propter quid*. But the knowledge of why (*propter quid*) the effect is, is not the knowledge that (*quia*) it is an effect. Therefore the knowledge of the effect does not depend on itself, but upon something else.[15]

The Commentator recognizes a double procedure in natural science. The first is from what is less known to nature to what is more known to nature, and is from effect to cause. The second is from what is more known to nature to what is less known to nature, and is from cause to effect. . . . Natural science begins both from the causes and from what is caused, but in different senses. It begins from the causes "inclusively," that is, by knowing them; but from the things caused "exclusively," that is, by knowing by means of them. . . . There is thus a twofold knowledge of every cause, the one kind by the procedure *quia* and the other by the procedure *propter quid*. The second kind depends on the first, and the first is the cause of the second; and thus the procedure *quia* is also the cause of the procedure *propter quid*.[16]

During the fifteenth century attention was increasingly focused on this "double procedure" involved in scientific method. It came

[14] *Urbanus Averoysta philosophus summus . . . commentorum omnium Averoys super librum Aristotelis de physico audito expositor,* Venice, 1492; comm. Text II.

[15] *Summa philosophiae naturalis magistri Pauli Veneti,* Venice, 1503; I, cap. ix.

[16] *Expositio Pauli Veneti super octo libros Physicorum Aristotelis,* dated 1409; Venice, 1499; I, comm. Text 2.

to be known by the Averroistic term "regress"; the dependence of all strict demonstration on the prior investigation and establishment of the appropriate principles was strongly emphasized, and the details of that establishment were carefully examined. The outstanding natural philosopher of the middle of the century, Cajetan of Thiene (*1465), repeats Paul's treatment.[17]

The fullest account of these problems is to be found in the commentary of Agostino Nifo on the *Physics* (1506). After explaining the three kinds of demonstration in Averroes's *prohemium*, and assigning to natural philosophy the two procedures, "the one from the effect to the discovery of the cause, the other from the cause discovered to the effect,"[18] Nifo takes up at once the question whether this is a circular proof, and cites Philoponus, Themistius, and Averroes in defense of such a *regressus*.

> Recent writers (*recentiores*) maintain that there are four kinds of knowledge. The first kind is of the effect through the senses, or observation; the second is the discovery (*inventio*) of the cause through the effect, which is called demonstration *of sign;* the third is knowledge of the same cause through an examination (*negotiatio*) by the intellect, from which there first comes such an increased knowledge of the cause that it is fit to serve as the middle term of a demonstration *simpliciter;* the fourth is a knowledge of that same effect *propter quid*, through that cause known so certainly as to be a middle term.

Since the second knowledge of the effect differs widely from its initial observation, this is no circle, but rather a "regress." Nifo then asks, what is this examination or *negotiatio* by the intellect? It is clearly neither a demonstration nor a definition, nor is it induction.

> This *negotiatio* is composition and division. For when the cause itself has been discovered, the intellect composes and divides until it knows the cause in the form of a middle term. For though cause and middle term be the same thing, they differ in their form (*ratio*). For it is called the cause in as much as the effect proceeds from it, whether it be better known than the effect or not. But it is a middle term in as much as it is a definition. From effect to cause is thus the procedure of discovering the cause; *negotiatio* is directed toward the cause as a middle term and a definition. But

[17] *Gaietani de Thienis, Recollecte super octo libros Physicorum Aristotelis,* Venice, 1496; Lib. I, Quest. v.

[18] *Augustini Niphi philosophi suessani expositio . . . de Physico auditu,* Venice, 1552; I, com. Text 4.

since a definition is discovered only through composition and division, it is through them that the cause is discovered in the form of a middle term, from which we can then proceed to the effect.[19]

Nifo later added a further *recognitio* in which he suggests another view of what he calls "demonstrative regress."

It is customary to treat at length the regress in physical demonstrations; I say "physical," because there is no regress in mathematics. In this difficulty the most recent writers (*iuniores*) conceive three kinds of knowledge in the demonstrative regress. The first is knowledge that the effect is (*quia*), *i.e.*, that the proposition signifying the effect is true; and this knowledge comes from the senses. For instance, that man has the capacity for science is known by sense. The second kind of knowledge is of the reason why (*propter quid*) what is observed by sense is so. Thus we consider the reason why man has the capacity for science, and not the brute; and we say, because he has a rational soul. Therefore of the effect, or of the proposition signifying the effect, there are two kinds of knowledge: the one, that it is true, and this is clear to sense; the other, why it is so, and this is known to us through the discovery of the cause. Of the cause, or of the propositions signifying the cause, there is but one kind of knowledge, and this is discovery (*inventio*), which is nothing else than that it is the cause, or that the propositions signifying the cause are true. Hence these writers conceive that through this knowledge which is the discovery of the cause, or that the propositions which signify the cause are true, there is learned the reason why the effect is so, or why the conclusion which signifies the effect is true. Thus in the regress in physical demonstration there are three kinds of knowledge, of which two are of the effect while the third is the discovery of the cause. When the last is related to the effect, it is the reason why the effect is so; but when it is related to the cause, it is the fact that it is the cause. And this discovery is made through the effect.

It is significant that Nifo cites his examples from the *History of Animals,* the most empirical of the Aristotelian writings.

From this it is clear that there is no need of any *negotiatio* to render greater our knowledge of the cause, as we formerly held; for the mere knowledge that it is the cause is the reason why the effect is so. Yet when I more diligently consider the words of Aristotle, and the commentaries of Alexander and Themistius, of Philoponus and Simplicius, it seems to me that in the regress made in physical demonstrations the first process, by which the discovery of the cause is put into syllogistic form, is a mere hypothetical (*coniecturalis*) syllogism, since through it the discovery of the

[19] *Ibidem.*

cause is syllogized in a merely conjectural fashion. But the second process, by which is syllogized the reason why the effect is so through the discovered cause, is demonstration *propter quid*—not that it makes us know *simpliciter*, but conditionally (*ex conditione*), provided that that really is the cause, or provided that the propositions are true that represent it to be the cause, and that nothing else can be the cause. . . . But you object that in that case the science of nature is not a science at all. We must say that the science of nature is not a science *simpliciter*, like mathematics. Yet it is a science *propter quid*, because the discovery of the cause, gained through a conjectural syllogism, is the reason why the effect is so. . . . That something is a cause can never be so certain as that an effect exists; for the existence of an effect is known to the senses. That it is the cause remains conjectural, even if that conjectural existence is better known than the effect itself in the order of knowledge *propter quid*. For if the discovery of the cause is assumed, the reason why the effect is so is always known. Hence in the *Meteors* Aristotle grants that he is not setting forth the true causes of natural effects, but only in so far as was possible for him, and in conjectural or hypothetical fashion.[20]

Here, then, at the beginning of the sixteenth century we find plainly set forth a formulation of the structure of a science of hypothesis and demonstration, with the dependence of its first principles upon empirical investigation. This was the one element in the Aristotelian theory of science that had remained obscure. The *Posterior Analytics* had seemed to say that while the principles and causes in terms of which a given subject-matter might be understood were to be discovered through sense-experience, they were seen to be true by νοῦς, by sheer intellectual vision. The scholastic theologians, like Thomas and Duns Scotus, had been led by their Augustinian Platonism to emphasize this power of *intellectus* to recognize the truth of principles. It is significant that at no time do the Paduan medical Aristotelians attribute any such perceptive power to intellect. The method by which principles are arrived at is rather the guarantee of their validity; they are "dependent" on that method, and it is the "cause" of their explanatory power. Nifo has merely made explicit what is implicit in the long previous discussion.

Each of the major logicians of the century added his bit to the rounding out of this conception. Achillini and Zimara both sharpen the distinction between mathematics, demonstrated *a priori*, and a science of nature which is demonstrated *a posteriori*, even in the

[20] *Ibid.*, comm. Text 4, *Recognitio.*

second part of its procedure, from causes to effects, or *propter quid.* Zimara makes a new distinction between *order,* concerned with the teaching and exposition of the subject-matter, and *method,* concerned with the discovery and demonstration of its principles and properties. The order of exposition, Achillini holds, should follow the order of nature. Though, as a Hellenist, Simon Porta, pupil of Pomponazzi and Achillini, brushes aside the traditional long discussions of method, he still accepts the "double method" of natural science, following Alexander as the best interpreter. Natural things can be considered either as they have been made and generated, or as they are; in the latter investigation we must proceed by dividing, from effects. He admits the "regress" as the procedure to be followed in physics: first there is the way of discovery, by which alone principles are learned from the investigation of experience; then the way of science and judgment by which we explain that experience.

Pomponazzi's commentary on the *Physics* remains unpublished;[21] in his printed works his treatment of method is psychological rather than logical. His whole argument from the necessity of sense-images in all knowing leads him to emphasize the intimate union of the particular and the universal, and the necessity not only of starting with the former but also of returning to it by a "*reditus.*" Like most of the later Paduans, he follows Alexander rather than Thomas and Averroes in maintaining that the intellect must know particulars directly, in order to abstract universals from them.

> Since the human soul grasps the singular first through the cogitative power, and then the universal through the intellect, contemplating it in the same singular that is known through the sense-image, it truly makes a return (*reditum*), and consequently a conversion; since from the singular known through a sense-image the same soul returns through the intellect to the same thing.[22]

The two operations of the intellect he takes to be composition and disjunction.

Bernardinus Tomitanus (*1576), holder of the chair in logic at Padua for years and teacher of Zabarella, carried the development a step farther. He was almost wholly preoccupied with questions of method. In physics both discovery and demonstration proceed

[21] A manuscript at Arezzo is described by Fiorentino in his *Studi e Ritratti,* pp. 63–79, but nothing touching on method is quoted.

[22] *De immortalitate animae,* cap. xii, 3. *Cf. Apologia,* I, cap. 3.

from signs, that is, from particular effects; from universals to particulars is the way of explaining and stating what has been discovered in the contrary way. He vigorously defends the "regress" as the method of natural science; it is the combination of demonstration *quia* and *propter quid*. And for the first time demonstration *quia* is formally identified with "induction" as the way of inquiry (*inquisitio*). Without the use of the method of induction, or of the "regress," there could be no science of nature at all for the Peripatetic.

With the same simplicity and lucidity with which he summed up the collective wisdom of the Paduan school on all their other problems, Zabarella formulated the classic version of their teaching on method, in the terms and with the distinctions later so fruitfully employed and consciously expressed by Galileo. Out of this long and patient critique of the Aristotelian theory of science there developed at last the method that was to issue in fresh triumphs over nature. Logic Zabarella regards, following the Greeks, not as a science, but purely as an instrument.

> The whole treatment of logic is about second notions; but these are our own work, and by our will can either be or not be. They are therefore not necessary things, but contingent, and hence do not fall under science, since science is only of necessary things.[23]

Logic is a tool, sought not for its own sake but for its utility in furthering science.

> Logic is an instrumental intellectual state of mind (*habitus*) or instrumental discipline, created by philosophers from the practice of philosophy, which constructs second notions in the concepts of things, and makes them into instruments by which in all things the true may be known and distinguished from the false.[24]

In this sense it is like the other instrumental discipline, grammar. But logic is really twofold, "one applied to things, and already put to use; the other separate from things"; and the former is identical with science itself. For the sciences are "nothing other than logical methods put to use."[25]

For Zabarella, therefore, logic and method are interchangeable terms; and he criticizes the logicians, who ought to treat method

[23] *De Natura Logicae*, L. I, c. iii.

[24] *Ibid.*, I, c. xx.

[25] *De Methodis*, L. I, c. i.

carefully, for leaving it rather to the physicians, who in turn neglect Aristotle for their cherished Galen. "Method is an intellectual instrument producing knowledge of the unknown from the known. . . . Method has the force of inference, and connects this with that."[26] Method is therefore the same as the syllogism: "the definition of method does not differ from the definition of the syllogism." The syllogism is, in fact, "the common genus of all methods and logical instruments."[27] Since all necessary connection is causal in character, all method must be either from cause to effect or from effect to cause. There are hence only two possible methods, composition and resolution.

> For all scientific progress from the known to the unknown is either from cause to effect or from effect to cause. The former is the demonstrative method, the latter the resolutive; there is no other procedure which generates a certain knowledge of things. For if we progress from something to something else, of which neither is the cause of the other, there cannot be between them any essential and necessary connection; hence no certain knowledge can follow from that progress. It is thus clear that there can be no scientific method except the demonstrative and the resolutive. . . . Demonstrative method is a syllogism generating science from propositions that are necessary, immediate, better known, and the causes of the conclusion. . . . Resolutive method is a syllogism consisting of necessary propositions, which leads from things that are posterior and effects that are better known to the discovery of prior things and causes.[28]

Zabarella makes the Averroistic distinction between the resolutive method suitable for natural science and the "analytic" method of mathematics. In the latter, both the principles and the consequences have the same certainty and are coördinate, so that whether we start with the one or the other is a merely technical question. In natural science, however, we must start with effects observed by the senses.

> Since because of the weakness of our mind and powers the principles from which demonstration is to be made are unknown to us, and since we cannot set out from the unknown, we are of necessity forced to resort to a kind of secondary procedure, which is the resolutive method that leads to the discovery of principles, so that once they are found we can demonstrate the natural effects from them. Hence the resolutive method is a subordinate

[26] *De Methodis*, III, caps. ii, i.

[27] *Ibid.*, L. III, iii.

[28] *Ibid.*, III, xvii, xviii.

procedure, and the servant of the demonstrative. . . . The end of the demonstrative method is a perfect science, which is knowledge of things through their causes; but the end of the resolutive method is *discovery* rather than science, since by resolution we seek causes from their effects that we may afterwards know the effects from their causes, not that we may rest in a knowledge of the causes themselves. . . . It is certain that if in coming to any science we were already in possession of a knowledge of all its principles, resolution would there be superfluous.[29]

There are two kinds of resolutive method, two ways of discovery, which differ greatly in their power.

The one is demonstration from effects, which in the performance of its function is exceedingly efficacious; and we employ it for the discovery of those things that are very obscure and hidden. The other is induction, which is a much weaker form of resolution, and is employed for the discovery of only those things which are hardly unknown, but need only to be made a little clearer.

By induction we discover only those principles that are "known *secundum naturam*," that is, that are sensible, in that their instances or singulars are perceived by sense. By demonstration *a signo* we can discover those principles that are "unknown *secundum naturam*," that is, the instances of which are not sensible, and hence can only be inferred from their effects, like first matter or the prime mover. Zabarella is here following his teacher Tomitanus in making "induction" a form of the method of resolution. His distinction between the two kinds of resolution in terms of the two kinds of principle discovered is that between arriving at a formal and at an explanatory principle; it is analogous to that made in the next century between the laws of motion and the forces causing acceleration, between the mathematical principles of natural philosophy and the forces of inertia and gravitation—both of which Newton likewise "deduced from phenomena."

By these differences, then, induction is distinguished from demonstration from effects. For each is a resolutive method of going from posterior things to principles. But two kinds of principle are presented to us. The one kind is known "naturally" [i.e., by sense], and hence needs no logical instrument except induction, by which alone such principles can be made known. For all our knowledge takes its origin from sense, nor can we know anything with our minds unless we have known it first by sense. Hence all principles

[29] *Ibid.*, III, xviii.

of this kind are made known to us by induction, and are therefore not said to be demonstrated or proved; for those things only are said to be proved, strictly speaking, which are demonstrated through something else. But induction does not prove a thing through something else; in a certain sense it reveals that thing through itself. For the universal is not distinguished from the particular in the thing itself, but only by reason. And since the thing is better known as a particular than as a universal, because it is said to be sensible as particular and not as universal, induction is thus a process from the same thing to the same thing—from the same thing in that aspect in which it is more obvious, to the knowing of that same thing in that aspect in which it is more obscure and hidden. Therefore not only are the principles of things known by induction, but also the principles of science or of knowing itself, which are said to be indemonstrable. . . . The principles of the demonstrative method, then, are discovered by the resolutive method, some by induction alone, others by demonstration *a signo*.[30]

The originality of Zabarella, and of the whole development of which he is the culmination, is thus to set off a "scientific experience" from mere ordinary observation, the accidental or planless collection of particular cases. The weakness of the logic of the Schoolmen had lain precisely in their acceptance of first principles established by mere common observation. In contrast, Zabarella, and with him the whole new science, insisted that experience must first be analyzed carefully to discover the precise "principle" or cause of the observed effects, the universal structure involved in them. After this analytic way of discovery has been pursued, we are then in a position to demonstrate deductively how facts follow from this principle or cause: we can pursue the way of truth. Scientific method, that is, proceeds from the rigorous analysis of a few selected instances or illustrations to a general principle, and then goes from that principle back to the systematized and ordered body of facts, to the science itself formally expressed. Zabarella calls this the combination of the resolutive and the compositive methods; and such were precisely the procedure and the terms of Galileo.[31] The presupposition of this method is of course that there exists an intelligible structure in the subject-matter under examination, of which the particular cases observed by the senses are instances; Zabarella makes this perfectly plain.

[30] *Ibid.*, III, xix.

[31] For a typical statement of Galileo on the joint use of the *"metodo risolutivo"* and the *"metodo compositivo,"* see his *Opere, Ed. Nazionale*, IV, 520. For a beautiful illustration, see the account of his first disciple, Benedetto Castelli, in Galileo, *Opere, Ed. Naz.*, XVII, 160ff. See also *Opere*, VII, 75, and VIII, 212.

Demonstrative induction can be carried on in a necessary subject-matter, and in things that have an essential connection with each other. Hence it does not take all the particulars into account, since after certain of them have been examined our mind straightway notices the essential connection, and then disregarding the remaining particulars proceeds at once to bring together the universal. For it knows that it is necessary that the same relations should be embodied in the rest.[32]

No clearer statement could be made of the procedure of the seventeenth-century scientists.

This double method, and particularly the analysis of instances, Zabarella considers more fully in his little work *De Regressu*.

The regress is between cause and effect when they are convertible and the effect is better known to us than the cause. For since we must always set out from what is better known to us, we first demonstrate from the known effect the unknown cause, and then return (*regredimur*) from the cause so known to the effect to be demonstrated, that we may know the reason why it is so.[33]

Zabarella does not bring in "nature," like Aristotle; for it is a logical and not a metaphysical question he is considering. "Both demonstrations are made by us and for us ourselves, not for nature."[34] In our way of discovery we are following the order of knowledge, not that of things. Like Nifo, Zabarella finds four stages in the procedure that is the regress. First we observe the particular effect. Secondly, we resolve the complex fact into its component parts and conditions. Thirdly, we examine this supposed or hypothetical cause by a "mental consideration" to clarify it and to find its essential elements. Finally, we demonstrate the effect from that cause.

When the first stage of the procedure has been completed, which is from effect to cause, before we return from the latter to the effect, there must intervene a third intermediate process (*labor*) by which we may be led to a distinct knowledge of that cause which so far has been known only con-

[32] *De Regressu*, c. 4. *Cf.* Galileo: "The knowledge of a single fact acquired through the discovery of its causes prepares the mind to ascertain and understand other facts without need of recourse to experiments, precisely as in the present case, where by argumentation alone the Author proves with certainty that the maximum range occurs when the elevation is 45°. He thus demonstrates what has never been observed in experience." (*Opere, Ed. Naz.*, VIII, 296.)

[33] *De Regressu*, c. 1.

[34] *Ibid.*, c. 2.

fusedly. Some men [Nifo] knowing this to be necessary have called it a *negotiatio* of the intellect. We can call it a "mental examination" of the cause itself, or a "mental consideration." For after we have hit upon that cause, we begin to consider it, so that we may also understand what it is. —Zabarella then proceeds to a further analysis of this "mental consideration."—But what this mental consideration may be, and how it is accomplished, I have seen explained by nobody. For though some say that this intermediate *negotiatio* of the intellect does play a part, still they have not shown how it leads us to a distinct knowledge of the cause, and what is the precise force of this *negotiatio*. . . . There are, I judge, two things that help us to know the cause distinctly. One is the knowledge that it is, which prepares us to discover what it is. For when we form some hypothesis about the matter (*in re aliquid praenoscimus*) we are able to search out and discover something else in it; where we form no hypothesis at all, we shall never discover anything. . . . Hence when we find that cause to be suggested, we are in a position to seek out and discover what it is. The other help, without which this first would not suffice, is the comparison of the cause discovered with the effect through which it was discovered, not indeed with the full knowledge that this is the cause and that the effect, but just comparing this thing with that. Thus it comes about that we are led gradually to the knowledge of the conditions of that thing; and when one of the conditions has been discovered we are helped to the discovery of another, until we finally know this to be the cause of that effect. The regress thus consists necessarily of three parts. The first is a "demonstration that" (*quod*), by which we are led from a confused knowledge of the effect to a confused knowledge of the cause. The second is this "mental consideration," by which from a confused knowledge of the cause we acquire a distinct knowledge of it. The third is demonstration in the strictest sense (*potissima*), by which we are at length led from the cause distinctly known to the distinct knowledge of the effect.[35]

These three phases may indeed occur simultaneously: they are logically rather than psychologically distinct. "The end of the regress is a distinct science of effects, which is called science *propter quid*."

The theory of science set forth in the *Analytics* is a theory of proof, not a theory of discovery. Here within the school of Paduan Aristotelians, there has been worked out what was so sorely needed, a logic of investigation and inquiry. No longer are the first principles of natural science taken as indemonstrable and self-evident: they have become hypotheses resting upon the facts they serve to explain. If Zabarella did not follow up the suggestion of Nifo that all natural science therefore remains conjectural and hypothetical,

[35] *Ibid.*, c. 5.

it was because he believed that an examination of particular instances would reveal an intelligible structure present in them; and this was precisely the faith that inspired seventeenth-century science.

> *Principia essendi* are not propositions but things, nor are they of necessity known beforehand. But often they are unknown; and they can be demonstrated *a posteriori,* though not *a priori.* For if they themselves had prior principles they would not be principles.[36]

But these principles of existence are no mere conveniences of knowledge; they belong to their subject-matter, and are part of the intelligible structure of the world.

> Propositions accepted in demonstrations from effects, if we consider them in themselves, are no less necessary, less *per se,* or less essential, than the propositions of strict demonstration. But if we consider our minds, they are not so clearly known by us to be necessary as the propositions of strict demonstration. Still we recognize a certain kind of necessity in them; if not so much as is really there, at least so much as suffices for that syllogism to deserve the name and nature of demonstration.[37]

It is not surprising that Galileo should so often sound like Zabarella. For he arrived in Padua in 1592, while the echoes of the great controversies over method between Zabarella on the one hand and Francesco Piccolomini and his disciple Petrella on the other, fought in the 1580's, were still resounding—controversies of which a witness has recorded:

> The school of logic at Padua was divided into two sects, those who were partisans of Zabarella, and those who were partisans of Petrella, and a multitude seemed to stand on either side. After this most exalted and famous controversy, so useful and fruitful to all students of logic, both published commentaries on the *Posterior Analytics;* than which commentaries, though they are different, and contain divergent teaching, in the common judgment of learned men nothing can be found more exquisite or more clear.[38]

In these two controversies, the points at issue were relatively minor in comparison with the bulk of agreement on method. Piccolomini, an older man, holder of the first chair of natural philosophy since 1564, had come to Padua from Siena, bringing a certain

[36] *De tribus praecognitis,* c. iv.

[37] *De speciebus demonstrationis,* c. x.

[38] A. Riccoboni, *De gymnasio patavino,* Padua, 1598; IV, c. xi.

Platonism with his Aristotelianism; but though he defends some Platonic positions, on method he is as advanced as Zabarella, and as near to the ideas of the seventeenth-century scientists. He agrees on the central importance of resolution as the way of discovery. But against his demand that metaphysics must furnish the starting-point and the frame of reference in all science, and that the scientist must imitate the fixed structure of nature, Zabarella maintains the independence and self-sufficiency of natural science, and indeed of each particular subject-matter, making the end of knowledge and inquiry a human thing, and directing the sciences toward human goals and aims. He defends the knowledge given by induction as perfect in its own kind, the constitution of man being what it is; it is no mere substitute for something that might be better gained in a more perfect way. And against Piccolomini's Platonic conception of a natural order of perfections which science must follow, he maintains a purely immanent conception of natural ends: the perfect functioning of each kind of thing in the universe is its only end, and each subject-matter is to be understood in terms of its own principles. Indeed, in his criticism of Platonic notions of teleology Zabarella went far along the path the radical graduate of Padua, Telesio, was following.

Zabarella's version of the Aristotelian logic, though interpreted and colored in terms of each of the three great theories of knowledge inherited and reconstructed by the seventeenth-century thinkers, and though receiving in practice wide variations of emphasis on its several parts, remained the method and ideal of science for all "natural philosophers" until the fresh criticisms of Locke and Berkeley. For though the language is diverse, the whole great literature on method that fills the scientific writing of the seventeenth century is at bottom a series of footnotes to the *Organon* of Aristotle. Indeed, the more fully the record of late medieval and Renaissance thought is studied, the clearer it becomes that the most daring departures from Aristotelian science were carried on within the Aristotelian framework, and by means of a critical reflection on the Aristotelian texts—however various the sources of the ideas that fertilized that criticism. The "father" of modern science, in fact, turns out to be none other than the Master of them that know.

With Zabarella the Paduan school had reached its culmination and done its work. His single successor, Cesare Cremonini (*1631), went still farther in an appeal to experience. His *Tractatus de*

paedia (1596) sounds like the solemn warning of the great tradition of Aristotelian rational empiricism to the triumphant mathematicians.

> *Paedia* is the power of judging rightly about the manner of teaching and learning, founded on logic, with the opportune intervention of experience. . . . Its intrinsic function is to understand, dispose, and constitute the general method of all procedures. As *Paedia* is the mother and nurse, so is method the daughter and child. I add, "with the intervention of experience," because, though one be instructed by genius or by logic, unless he be also experienced in the very thing in which he is to judge, he will there exercise no judgment. I say "opportune," or appropriate, because the same manner of experience is not found everywhere. In mathematics, for the confirming of principles it is sufficient to employ induction based on the observation of what is in the materials whence mathematics is abstracted; in that field the truth of the principles is immediately evident. But in the natural sciences such observation is not so obvious a way of gaining principles, nor is the collection of principles by its employment so easy. There is indeed required a laborious attention, procured from a zealous application to things; and even with it the principles are arrived at not without keen thought. Moreover, this experience is necessary not only for the natural scientist, if he is to arrive at first principles; it is requisite for almost every manner of science. For experience is likewise required in morals in much the same fashion, and even in divinity, since we do not ascend to those abstract causes without a manifold and laborious attention to their effects.[39]

And so he counseled ever closer attention to the way of discovery, to the careful and painstaking analysis of experience, to the method of resolution, within which he included as phases both induction and demonstration *a posteriori*.

There was but one element lacking in Zabarella's formulation of method: he did not insist that the principles of natural science be mathematical, and indeed drew his illustrations largely from Aristotle's biological subject-matter. Though he had studied mathematics under Catena and Barocius, and was accounted expert in optics and in astronomy, these studies failed to leave any fundamental impress on his thought. The gradual emergence of mathematics into the dominant position it held in the seventeenth century is due to its cultivation by a small group of men working on the periphery of the main intellectual movements of the sixteenth century. There is a conventional view that this shift to mathematical

[39] *Tractatus de paedia*, c. ii; in *Explanatio proemii librorum Aristotelis de Physico auditu;* Padua, 1596.

interests was powerfully furthered by the Renaissance revival of Platonism and its number mysticism, derived from Proclus, from the Pythagorean tradition, and from the Cabala. In the Germanies this has some basis in fact, and Kepler may stand as its consummation. But it is difficult to find any support for the view that attributes the great achievements of the Italians in mathematics and mechanics to the influence of Neoplatonism. On the one hand the Italian Platonists had almost no scientific interest in mathematics, and their "numbers" led them at once to the mazes of theology and theosophy. And on the other, with rare exceptions the Italian mathematicians down through Galileo, when they possessed a philosophical interest at all, were not Platonists but Aristotelians in their view of mathematics, of its relations to physics, and of the proper method of natural knowledge. What they found in the ancients and what they worked upon themselves was no mathematical vision of the world, but effective techniques and practical problems of procedure and discovery. What they constructed as "new sciences" it remained for Descartes to interpret in the light of the tradition of Augustinian Platonism.[40]

Indeed, the one contribution the Humanists can fairly claim to have made to the rise of modern science was to send men to the study of the original ancient sources in mathematics. In reëstablishing connection with the mathematics and mechanics of the Hellenistic Age, the appeal to the ancients introduced Archimedes and Hero, as well as Apollonius, Pappus and Diophantus. The mathematical methods of analysis and synthesis of Archimedes, of whom Tartaglia published the first Latin edition in 1543, were the one element which neither the fourteenth-century Ockhamites nor the sixteenth-century Paduans possessed. From them the mathematicians took their start, and carried the day for the quantitative side of the Paduan discussion, to which reference has been made above.

With this mathematical emphasis added to the logical methodology of Zabarella, there stands completed the "new method" for which men had been so eagerly seeking. By the analysis of the mathematical relations involved in a typical "effect" or phenomenon we arrive at its formal structure or "principle." From that principle we deduce further consequences, which we find illustrated and confirmed in experience. Science is a body of mathematical

[40] See E. W. Strong, *Procedures and Metaphysics, a Study in the Philosophy of Mathematical-Physical Science in the 16th and 17th Centuries.*

demonstrations, the principles of which are discovered by the resolution of selected instances in experience. This is the method called by Euclid and Archimedes a combination of "analysis" and "synthesis," and by the Paduans and Galileo, "resolution" and composition."[41] It is traditional and Aristotelian in regarding the structure of science as dialectical and deductive, and in seeing all verification and demonstration as inclusion within a logical system of ideas. It has altered the scheme of the medieval Aristotelians in making the principles of demonstration mathematical in character; and to the scholastic empiricism it has added the insistence that the way of discovery is not mere observation and generalization, not mere abstraction from common experience, but a careful and precise mathematical analysis of a scientific experience—what the medical tradition of Padua called "resolution" and what Archimedes called "analysis." And to that experience demonstration must return, in a "regress," for confirmation, illustration, and the guarantee of the existence of the deduced consequences. But the return to experience is not for the sake of certain proof: for throughout the seventeenth century it is almost impossible to find any natural scientist maintaining that a mere fact can prove any certain truth.

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[41] The precise form of the combination of the *metodo resolutivo* and the *metodo compositivo* Galileo most frequently employed he called the *"argomento 'ex suppositione,'"* and described most explicitly in his letter to Carcavi in 1637 (*Opere, Ed. Naz.*, XVII, 90); it is clearly illustrated in his discussion of naturally accelerated motion in the *Two New Sciences* (Eng. tr. by Crew and De Salvio, 161). The scientist begins with a "hypothetical assumption," a mathematical hypothesis that does not come immediately from the observation and measurement of facts, but rather from an analysis of the mathematical relations involved in a given effect. The properties that must follow are then deductively demonstrated. Thirdly, cases or illustrations of that effect are analysed to discover how far those properties are really exemplified in them and confirmed by them. The demonstration Galileo calls the "compositive method"; the term "resolutive method" he applies both to the initial mathematical analysis of the problem, and to the confirming analysis of the examples. See E. W. Strong, *Procedures and Metaphysics*, ch. 6; E. A. Burtt, *Metaphysical Foundations of Modern Physical Science*, p. 70 ff.; F. Wieser, *Galilei als Philosoph*, pp. 51–68).

THE MONA LISA IN THE HISTORY OF TASTE

By George Boas

The search for aesthetic standards by means of which any work of art can be finally judged would seem to presuppose either that every such work is an unchanging entity, or that, regardless of whether it changes or not, it should always be judged in the same way. Neither of these presuppositions appears tenable to the writer of this paper, who holds, on the contrary, that works of art are not the locus of one value, known as "beauty" or something similar, but are rather multivalent, that certain of their values are experienced by some persons, others by others, and that there is no *a priori* method—except that of fiat—of determining which of the many values are properly "aesthetic." One objection usually raised against this position is that there happen to be some works of art which "the judgment of posterity" has always held to be admirable or "great," and that one has only to examine their characteristics to discover what the distinguishing marks of great works of art are. The Parthenon, the *Aeneid, Hamlet,* and so on, it is maintained, have always enjoyed a high reputation. They are great by almost universal consent; or, if there have been periods when they were not highly esteemed, that is because the people of those periods had poor taste.

It cannot be denied that there are works of art which have almost always been greatly admired. (For the sake of the argument one may neglect those times when they were not discussed at all, having been overlooked for some reason or other.) But having admitted that, one faces the question whether the name, *Hamlet,* or the Parthenon, or the *Aeneid,* has always meant the same thing. Physically, the words or the shapes of stone in which they are embodied have changed little, though the little is not without some importance; but the physical basis of these and other works of art is only a small part of them. More important is what people have looked for in them and either found or not found. Thus the *Aeneid* as a Roman epic differs from the *Aeneid* as an instrument of magic, and *Hamlet* as a chivalric tragedy of revenge differs from *Hamlet* as a Freudian drama. It may be argued that the work of art as the artist intended it is the real work of art, and that we should suspend judgment until we have recaptured it in its primitive state. In most cases such a

quest is probably futile, for we often have no way of knowing what an artist intended, and in any event we can, for the most part, only reconstruct what he intended from what we ourselves find. And that is to no small extent dependent upon our education and our original nature. Moreover, to recapture through study an artist's intention is different from reacting directly to a work of art; and the professor of English literature who, having studied Elizabethan language and customs and theatrical practice and the biography of Shakespeare, reads *Hamlet,* is not psychologically identical with the Elizabethan spectator who went to the theater and saw *Hamlet* during what may be called its lifetime. Whatever else Shakespeare may have been up to, he was certainly not producing plays for professors of English to study three hundred years after his death. We may reasonably conclude that to define the work of art as the work intended by the artist gives us only the slenderest clues to appropriate standards for judging it.

The purpose of this paper is to take one of the works of art which have been most admired until recent times, and to examine briefly what critics or commentators of different periods have said about it. From what they said we hope to be able to infer what they were looking for. We are not so much interested in knowing why they admired the work of art as in knowing what they saw in it. It will be found that in at least this one case the work of art was identical with itself throughout history in name only. We have chosen as our example Leonardo's *Mona Lisa.*

I

The *Mona Lisa,* it should be recalled, is usually considered to be a portrait of the wife of Francesco del Giocondo, painted between 1503 and 1506. There is no conclusive evidence that it was intended as an allegory, though the background does not put that beyond the bounds of possibility.[1] No mention is made of it in the artist's literary remains, so that we do not know at what the artist himself was aiming. We do, however, know what he thought the proper fashion of representing women was, and that will be pointed out later.

[1] Everything about this famous picture has been disputed. We have accepted the traditional name of the sitter, but A. Venturi in the *Enciclopedia Italiana* maintains that she was Costanza d'Avalos and that the misty background did have allegorical significance. See his section in the article on Leonardo. L. Roger-Milès, in his *Léonard de Vinci et les Jocondes,* 1923, pp. 68 ff., maintains that it is not even a portrait.

Leonardo's contemporaries apparently did not consider the *Mona Lisa* his most important work. Several accounts of Italian painting, written during Leonardo's life or a little later, fail even to mention it. This is true of *Il Libro di Antonio Billi*[2] and of an anonymous work written during the forties of the sixteenth century.[3] Paolo Giovio, writing after Leonardo's death, says simply that he painted the portrait of Mona Lisa, "wife of Francesco del Giocondo, which was bought by King Francis I, it is said, for 4000 *scudi.*"[4] In the short *Vita* he mentions the *Last Supper* and tells the story of Louis XII's desire to cut it out of the wall on which it was painted, and the *Virgin and Saint Anne,* but does not mention the *Mona Lisa.* There is nothing here, except the unusually high price, which is of interest. The same may be said of the comment of Raffaelo Borghini, made in 1584, that the portrait was such *che non puo l'arte far davantaggio.*[5] More to the point is the criticism of Lomazzo, who praises it along with portraits by Raphael and Andrea del Sarto as peculiarly adapted to its subject.[6]

The most influential of the earlier comments on the *Mona Lisa* is that of Vasari, which established a tradition. This paragraph is the best known of the classical statements, and it was apparently the source of most of the anecdotes repeated in later times about the picture. It was first published in 1550, some forty-odd years after the portrait was painted. The passage runs as follows:

> Whoever shall desire to see how far art can imitate nature, may do so to perfection in this head, wherein every peculiarity that could be depicted by the utmost subtlety of the pencil has been faithfully reproduced. The eyes have the lustrous brightness and moisture which is seen in life, and around them are those pale, red, and slightly livid circles, also proper to nature, with the lashes, which can only be copied as they are with the greatest difficulty; the eyebrows also are represented with the closest exactitude, where fuller and where more thinly set, with the separate hairs delineated as they issue from the skin, every turn being followed, and all the pores exhibited in a manner that could not be more natural than it is: the nose, with its beautiful and delicately roseate nostrils, might be easily believed to be alive; the mouth, admirable in its outline, has the lips uniting the rose-tints of

[2] See de Fabriczy, *Arch. Stor. Ital.*, ser. V, tom. 7.

[3] *Ibid.*

[4] See Tiraboschi, *Stor. della lett. Ital.*, T. VI, p. iv, lib. iii, c. 7, xxxii (Venice, 1823, VI, 4–5, p. 1602).

[5] See *Il Riposo*, Florence, 1584, p. 370 f.

[6] G. P. Lomazzo, *Trattato dell' arte della pittura*, etc., Milan, 1584–85, p. 434.

their colour with that of the face, in the utmost perfection, and the carnation of the cheek does not appear to be painted, but truly of flesh and blood: he who looks earnestly at the pit of the throat cannot but believe that he sees the beating of the pulses, and it may be truly said that this work is painted in a manner well calculated to make the boldest master tremble, and astonishes all who behold it, however well accustomed to the marvels of art. Mona Lisa was exceedingly beautiful, and while Leonardo was painting her portrait, he took the precaution of keeping some one constantly near her, to sing or play on instruments, or to jest and otherwise amuse her, to the end that she might continue cheerful, and so that her face might not exhibit the melancholy expression often imparted by painters to the likenesses they take. In this portrait of Leonardo's on the contrary there is so pleasing an expression, and a smile so sweet, that while looking at it one thinks it rather divine than human, and it has ever been esteemed a wonderful work, since life itself could exhibit no other appearance.[7]

There are two important features in this criticism: first, it is Leonardo's skill that is the subject of admiration, rather than the effect of the picture upon the observer, or the "self-expression" of the artist, or a symbol of something called "the times"; second, the painter's skill is supposed to be directed towards reproducing a natural object as faithfully as possible.

To think of the artist as a craftsman who learns and applies a technique is, of course, not unusual in the history of criticism. Even the most fervent admirer of Croce would admit that some artists are more skillful technicians than others. But to focus one's appreciation upon this has been by no means a universal practice among critics. Forgetting, for the purposes of this paper, the past history of such an attitude, as seen, for instance, in the elder Pliny, it is not improbable that technical skill became particularly interesting in the Renaissance, when *homo faber* began experimenting and inventing as he had not done since Alexandrian days.

But one may praise an artist's skill and yet not believe that it was oriented towards a reproduction of "nature." One may admire the exquisite technique of an Odilon Redon, for instance, or a Braque, and say nothing whatsoever about the likeness of its result to anything natural. One may admire the technique of a Byzantine fresco

[7] Giorgio Vasari, *Lives of the Most Eminent Painters, Sculptors, and Architects*, tr. by Mrs. Jonathan Foster, London, 1876, II, p. 384 f. It is perhaps worth noting that in the eighteenth century Leonardo was to be blamed by at least one writer for too great fidelity to nature, uncorrected by a study of the antique. See [Dezallier d'Argenville,] *Abrégé de la Vie des plus Fameux Peintres*, 1745, p. 74.

in which the "natural" is almost completely recreated and transformed. The idea that "nature" was of interest and importance in her own right belongs to a period in which men seek to observe facts and record them, and think that observation and record are good in themselves. Vasari, who was himself a painter, is perhaps more sensitive to technical excellence than a critic who has no experience in producing works of art. His own paintings are, like those of most of his contemporaries, admirably skillful in perspective and other tricks of illusion. It is therefore possible, though not probable, that he was simply erecting his own type of skill into a standard for all artists.

It would, however, be sheer pedantry to attempt to prove what everyone knows, namely, that the Renaissance in Italy was marked by an almost religious regard for what later became natural science, and by a delight in the arts which helped man understand the things of nature.[8] The whole matter has been clearly and succinctly told by Burckhardt in his *The Civilization of the Renaissance in Italy*, and requires no retelling. But it may be said that the Italians of this period were the first men to rediscover natural beauty, to write biographies again, as the Alexandrians did, to describe in detail the human face and form, to collect strange animals and even strange people. It is in keeping with this taste that the sketch-books of Jacopo Bellini, of Leonardo, of Pisanello, and of their contemporaries are filled with drawings of animals, flowers, clouds, mountains, and other natural things.

But "fidelity to nature" is a notoriously equivocal formula. The multiple meanings of "nature" and its derivatives have been discriminated by A. O. Lovejoy and we shall not attempt to expand upon his treatment of the subject.[9] But we must notice what the phrase meant to Vasari and earlier to Leonardo. In the passage

[8] As early as 1493 Bellincioni had written a sonnet on another portrait by Leonardo, that of Cecilia Gallerani, the mistress of Ludovico Sforza. The sonnet plays upon the rivalry between art and nature and begins,

Di chi ti adiri? A chi invidia Natura?
Al Vinci che ha ritratto une tua stella . . .

(For the whole sonnet, see *Le Rime di Bernardo Bellincioni*, ed. by Pietro Fanfani, Bologna, 1878.) The idea is, of course, a literary commonplace and for that very reason of peculiar interest. The portrait, it may be added, seems to have disappeared. A similar idea is found in the Latin verses on a portrait of Lucrezia Crivelli in *The Notebooks of Leonardo da Vinci*, 1938, II, 394.

[9] See *Primitivism in Antiquity*, pp. 447 ff., and "Nature as Aesthetic Norm," *Mod. Lang. Notes*, XLII (1927), pp. 444 ff.

quoted from the biographer and critic, one observes that the artist is praised for reproducing the likeness of his sitter as Apelles is said to have reproduced the likeness of his grapes. Just as the birds in the classical instance pecked at the painted grapes, so the observer of the *Mona Lisa* believes the original to be before him, with beating pulses and living eyes. But before the passage is over one finds that Leonardo is praised also for painting the woman with a pleasant and smiling expression, as she appeared when listening to cheerful music or jesting talk; so that "while looking at it one thinks it rather divine than human."

How much literary exaggeration is expressed in these last words and how much they echo a Neoplatonic strain is hard to tell. Even in Leonardo, whose interest in reproducing natural objects led to those amazing anatomical and botanical and geological drawings, there are Neoplatonic elements. If he says, on the one hand, "Wisdom is the daughter of experience," and backs it up with minutely detailed studies of what he observes, he says on the other, "Nature is full of infinite causes which were never set forth in experience."[10] If he says, "O marvellous Necessity, thou with supreme reason constrainest all effects to be the direct result of their causes, and by a supreme and irrevocable law every natural action obeys thee by the shortest possible process," he also says, "Nature being capricious and taking pleasure in creating and producing a continuous succession of lives and forms . . . ."[11] Which of these Natures he saw as he drew his sketches, there is now no saying. But the probability is that most of his contemporaries saw in the sketches after they were drawn the capriciously creative and fertile Nature rather than the mechanistic and purely geometrical.

For a hundred or more years after Vasari there is little or no mention of the *Mona Lisa*. According to the French historian, Lemonnier,[12] Leonardo and his Italian *confrères* who were called to France by Francis I "furent traités avec toutes sortes d'égards et reçurent des appointements en rapport avec leur réputation." There was even circulated the old story that Leonardo died in the King's arms, a story now discredited.[13] But although more of his

[10] *Notebooks*, I, 85 and 77, respectively.

[11] *Ibid.*, I, 253 and 80 respectively. For a denial of the presence of Neoplatonism in Leonardo, see E. Panofsky, *Studies in Iconology*, 1939, p. 182. The writer of this paper is preparing a study of "nature" and allied terms in Leonardo.

[12] In Lavisse's *Histoire de France*, V, i, 316.

[13] See L. Roger-Milès, *op. cit.*, pp. 15 f. The story, as is well known, dates from the time of Vasari.

authentic pictures belonged to the crown—and now to the French Republic—than to any other single collector, most French writings of the sixteenth, seventeenth, and even eighteenth centuries are silent about him.[14] He is not mentioned in the letters of Marguerite d'Angoulême,[15] in the works of Rabelais, Montaigne—not even in his *Journal de Voyage*—nor the Pleiade; the courtiers, who might have seen at least the *Mona Lisa,* say nothing that we have been able to discover of either the picture or its author; even Louis Leroy, whose *De la Vicissitude ou variété des choses de l'univers* (1579) lists the painters whose works have raised his times to eminence, omits Leonardo's name. One possible reason for this is that the *Mona Lisa* belonged to the King and therefore not many people had the chance to see it. But the most famous pictures and sculptures of the time were made familiar to the interested public by engravings, and if Leonardo had captured the imagination of Frenchmen, his works would doubtless have been both known and spoken of, as those of Raphael were.[16]

In the middle of the seventeenth century, Leonardo's name and the *Mona Lisa* emerge once more. Père Dan, who made a catalogue of the works of art at Fontainebleau, calls it the *premier en estime, comme une merveille de la peinture.*[17] In whose estimation it ranked first and why it was considered a marvel are not revealed. Félibien, somewhat later, continues the Vasari tradition.

> This is one of the most finished of his works. It is said that he took so much pleasure in working on it that he spent four months on it, and that

[14] Though Poussin drew the illustrations for the edition of the *Trattato* which appeared in the middle of the seventeenth century, Leonardo was not so highly esteemed as Raphael, for instance, or even some of the lesser painters. *Cf.* A. Fontaine, *Les doctrines d'art en France,* 1909, p. 3.

[15] The sister of his great French patron, who, according to Roger-Milès, *op. cit.,* p. 65, is portrayed in Leonardo's (?) *Marriage of Saint Catherine.*

[16] The portrait could only have been seen by persons admitted to the "gilt cabinet" at Fontainebleau, which would have required special permission. It was removed to Versailles by Louis XIV, probably after 1694, the last date on which it appears in the inventories of Fontainebleau (See *La Grande Encyclopédie,* XVIII, p. 950). It was not exhibited in the Louvre until after the Revolution. It does not appear to have been engraved until the nineteenth century. For its history in France, see the catalogue of the Louvre by Georges Lafenestre and Eugène Richtenberger, tr. by B. H. Dausseron, p. 56.

[17] *Trésor des Merveilles de Fontainbleau* (1642), quoted by Rigollot, *Cat. de l'oeuvre de Léonard de Vinci,* 1849, pp. 65 ff. Cassiano del Pozzo in 1625 saw the painting and commented on its bad condition. See Müntz, *Léonard de Vinci,* 1899, p. 421.

while he was painting this lady there was always someone near her who sang or played some musical instrument, so as to keep her joyful and prevent her from assuming that melancholy air which comes over one easily when one is inactive and motionless.

Truly, said Pymandre, if I may give my opinion, the time which he put into it was well spent, for I have never seen anything more finished or more expressive. There is so much grace and so much sweetness in the eyes and features of this face, that it appears to be alive. When one looks at this portrait, one would say it was a real woman who takes pleasure in being seen.

It is true, I replied, that Leonardo appears to have taken particular care to finish it well. And Francis I considered this picture to be one of the most finished products of this painter, wished to own it, and paid four thousand *écus* for it.[18]

The excellence of Leonardo's artistry is judged in this passage by its "finish" in the representation of a gentle and sweet woman's face. The time given to the work, four months, becomes a matter of the greatest interest to subsequent critics, who vary it as they will. Vasari had said that Leonardo "loitered" over it for four years—not months—and then had left it unfinished. Lanzi, pointing out the unfinished state of most of Leonardo's pictures, continues by saying that the impression of lack of finish is attributable to the artist's having left certain portions of his pictures less perfectly finished than others. This deficiency, he says, cannot be detected always by the best judges. "The portrait, for instance, of Mona Lisa Gioconda, . . . was minutely examined by Mariette in the collection of the king of France, and was declared to be carried to so high a degree of finish that it was impossible to surpass it."[19] Stendhal passes on the story, saying that the artist "never considered it finished."[20] Delecluze reduces the time to three years.[21] The story continues to our own day through Houssaye, the American Moses F. Sweetser,

[18] André Félibien, *Entretiens sur les vies et sur les ouvrages des plus excellens Peintres anciens et modernes*, 2d ed., 1685–1688, I, 193 f.

[19] Luigi Lanzi, *The History of Painting in Italy*, tr. by Thomas Roscoe, new ed. rev., 1853. The history was first published in 1789 and was considered for many years authoritative. It was translated and revised by the Reverend G. W. D. Evans in 1848. In translation the passage appears, "the labor of four years, and, after all, left unfinished." Mariette was the author of the *Abecedario de Pierre Jean Mariette*, which I have not seen.

[20] *Hist. de la Peinture en Italie*, 1817, I, 223 f.

[21] *Léonard de Vinci*, 1841, p. 29.

his contemporary, Mrs. Charles W. Heaton, Gabriel Séailles, Mantz, Edward McCurdy, E. V. Lucas, and even Elbert Hubbard.[22]

II

For some three hundred years no one appears to have seen anything mysterious about this painting. It was the portrait of a certain merchant's wife in a cheerful mood, and what was found extraordinary in it was its fidelity to nature. But a merchant's wife is still a woman, and women began to occupy a curious position in many early nineteenth-century minds. They had previously been cruel, coquettish, vain, deceitful, gentle, fickle, tender, weak, but they had rarely been enigmatic. On the contrary, men knew them only too well. But the early nineteenth century introduced a new woman into the history of ideas—*la femme fatale*.[23]

The *femme fatale* emerged with Romanticism. She was all sensation and feeling, as against masculine rationality. She captured men by her apparent passivity, lying in wait like a fascinating serpent for the flitting bird who was the male. Whether the Romanticists knew it or not, she could trace her ancestry back to the Eve of Philo Judaeus. The Romantic critics, whether they were engaged in interpreting paintings or poetry, treated their works of art as if they were hieroglyphs. Each had a hidden "meaning" which only the initiated could uncover. To be one of the initiated, one must have a peculiar kind of sensitivity, an eye that not merely saw the perceptual screen of things but penetrated to something called the reality behind it. Such metaphors in practice meant that the critic was not to record what he saw, but to let his imagination freely play about the work of art and to report what it constructed.

What Vasari was for the pre-nineteenth century critic, Théophile Gautier and Walter Pater became for their contemporaries and successors. Both started a tradition—in apparent independence of

[22] See respectively, *Hist. de Léonard de Vinci*, pp. 439 f; *Leonardo da Vinci*, Boston, 1879, p. 59; *Leonardo da Vinci and his Works*, 1874, p. 51 f; *Léonard de Vinci*, 1892, p. 140; *Leonardo da Vinci*, 1898, II, 158; *Leonardo da Vinci*, 1904, p. 113; *Leonardo da Vinci*, 1926, p. 9; *Little Journeys to the Homes of Eminent Artists*, 1902, X, ii, p. 46. Elbert Hubbard translated the sum of 4000 *scudi* into eighty thousand dollars. Stendhal had been content with forty five thousand francs.

[23] This is, of course, a commonplace, but see Mario Praz, *The Romantic Agony*, 1933, ch. IV, esp. pp. 243 ff. The reader also would do well to complete what follows in our text by pursuing Mr. Berenson's suggestion of the influence of Lavater and the other physiognomists. See his *The Study and Criticism of Italian Art*, 1916, p. 24.

each other—which has not died even to-day. Gautier's paragraph was the earlier published.

> Leonardo da Vinci retained the finesse of the Gothic period while animating it with a spirit entirely modern. . . . The faces of Vinci seem to come from the upper spheres to be reflected in a glass or rather in a mirror of tarnished steel, where their image remains eternally fixed by a secret similar to that of the daguerreotype. We have seen these faces before, but not upon this earth: in some previous existence perhaps, which they recall to us vaguely. How explain otherwise the strange, almost magic charm which the portrait of Mona Lisa has for even the least enthusiastic natures? Is it her beauty? Many faces by Raphael and other painters are more correct. She is no longer even young; her age must be that loved by Balzac, thirty years; through the subtle modelling we divine the beginnings of fatigue, and life's finger has left its imprint on this peachlike cheek. Her costume, because of the darkening of the pigments, has become almost that of a widow; a crêpe veil falls with the hair along her face; but the expression, wise, deep, velvety, full of promise, attracts you irresistibly and intoxicates you, while the sinuous, serpentine mouth, turned up at the corners, in the violet shadows, mocks you with so much gentleness, grace, and superiority, that you feel suddenly intimidated, like a schoolboy before a duchess. The head with its violet shadows, seen as through black gauze, arrests one's dreams as one leans on the museum railing before her, haunts one's memory like a symphonic theme. Beneath the form *expressed*, one feels a thought which is vague, infinite, *inexpressible*, like a musical idea. One is moved, troubled, images *already seen* pass before one's eyes, voices whose note seems familiar whisper languorous secrets in one's ears; repressed desires, hopes which drive one to despair stir painfully in the shadow shot with sunbeams; and you discover that your melancholy arises from the fact that la Joconde three hundred years ago greeted your avowal of love with this same mocking smile which she retains even to-day on her lips.[24]

Here simple fidelity to nature has completely disappeared; the eternal feminine has taken its place. The *Mona Lisa* is not the portrait of a young woman; she has ripened through experience. She recalls past lives, stirs up repressed desires, mocks you with her smile. At once a new strain enters into French criticism. Whereas the earlier critics had seen sweetness and gentleness, the later began to see something more troubling. Even Taine, who was scarcely a

[24] Théophile Gautier *et al.*, *Les Dieux et les demi-dieux de la peinture*, [1863], p. 24 f. The article on Leonardo first appeared in 1858. For further information about it, see Spoelberch de Lovenjoul, *Hist. des oeuvres de Théophile Gautier*, pp. 160, 262 ff.

victim of "the Romantic agony," found the famous smile "doubting, licentious, Epicurean, deliciously tender, ardent, sad," and united it to the smiles of the Saint John, the Saint Anne, and other Vincian smiles.[25] Houssaye, one of the co-authors of Gautier's book, who was interested enough in facts to write a life of Leonardo, also is captivated by the new mystery. He feels it his duty to bring in her "charm, provocative and ineffable, cruel and divine, sybilline and voluptuous."[26] This diabolical charm appears also, somewhat intensified, in Charles Blanc and Paul Mantz.

> Before a painting so wonderful and so admired, the time which was consumed in painting it is explained either by the fact that the artist experienced the fascination which he has so well expressed, and prolonged as far as possible the sweets of conversation with this charming woman, or that he had difficulty in expressing the proud serenity and restrained provocation of this face whose smile, at certain moments, seems satanic and still magnetises us by its long and voluptuous glances. It seems that after having carried the modelling to the point of the most delicate shading, to imperceptible accents, and thus brought it close to us by palpitating truth, the artist may have desired then to withdraw it into the mystery of half-light, to hold it remote from our gaze by shrouding it in a gauze and to make it appear as a dream amid a wild landscape, against an unbelievable background of little mountains, blue, rocky, pointed, cut from crystal, and like stalactites turned upwards towards the skies."[27]

All that was lacking now was an explanation of the mysterious charm of this face. The explanation must lie, according to romantic procedure, in the life of the painter, and it was not hard to find reasons for believing that the original Lisa was the mistress of the painter.[28] Charles Clément told the extraordinary story in full. He noticed, he says, that whereas the men's heads by Leonardo were all individualized, those of the women were all identical. On a panel belonging to the Orleans family was discovered a reclining female whose features were those of *La Gioconda*. In the Fesch Collection and in the Hermitage are two half-length nudes with the same face.

[25] H. Taine, *Voyage en Italie*, 1902 (1st ed. 1865), II, 409.

[26] Arsène Houssaye, *Op. cit.*, p. 125.

[27] *Hist. des peintres de toutes les écoles. Ecole Florentine*, 1879. See p. 27 f. for the full account. It is typical of writers of this school that they will say, "stalactites turned upwards towards the skies" rather than "stalagmites."

[28] *Michelangelo, Leonardo da Vinci and Raphael*, tr. by Louisa Corhan, (n.d.), pp. 201 ff.; French ed. 1861. A poem on the same theme was produced by M. A. Dollfus and may be found in Houssaye, *op. cit.*, pp. 335 f.

The original Lisa was the third wife of Giocondo—so that her husband must have been much older than she. Leonardo was young, witty and handsome when he painted her. The portrait at which "he worked or pretended to work" for four years never became the property of her husband. Finally, it is from the time when he painted the *Mona Lisa* that the other female heads begin to resemble hers.

As a matter of cold fact it requires no deep observation of Leonardo's portrait to see how little it resembles the Saint Anne and the Saint John and the various Madonnas. The one common character is the smile, but the series of thirty or more archaic maidens in the Acropolis museum in Athens have an identical smile, which they share with many other archaic statues of both men and women. Are we to conclude from this anything except that such smiles were the fashion of the times? Leonardo's saints and other supernatural beings do resemble one another; he gave them a certain "ideal" head. But the portraits attributed to him are individualized. The face of the *Mona Lisa* cannot be said to resemble the face of *La Belle Ferronière,* if that portrait be indeed by him. And neither of them closely resembles his saints.

Pater's famous passage on our painting is of course better known to English readers than Gautier's, and was perhaps the source of most later American and English interpretations of it. Pater suggests more than he states, whether from timidity, ignorance, or critical principle, but one may vaguely discern through his poetic prose that, like Clément, he finds a disconcerting similarity running through all the female heads and, like Gautier, a symbol of metempsychosis. The symbolism, he maintains, is not "crude," but the picture has "a subdued and graceful mystery." He believes that the "unfathomable smile, always with a touch of something sinister in it," plays over all of Leonardo's work. "From childhood we see this image defining itself on the fabric of his dreams; and but for express historical testimony, we might fancy that this was but his ideal lady, embodied and beheld at last." He suggests a fusion of his dream and the real Mona Lisa. And then follows the purple passage which has been reprinted even in anthologies of poetry. In that face "strange thoughts and fantastic reveries and exquisite passions" are "deposited cell by cell" upon the flesh. "All the thoughts and experiences of the world have been etched and moulded there, in that they have of power to refine and make expressive the outward form, the animalism of Greece, the lust of Rome, the reverie of the middle

age with its spiritual ambition and imaginative loves, the return of the Pagan world, the sins of the Borgias." Mona Lisa becomes the "fancy of perpetual life," a reincarnation of Leda, Helen, Saint Anne.[29]

Few art critics of the nineteenth century, capable of reading Pater, resisted his musical style, and we find dozens of imitators of him in the years that followed the publication of *The Renaissance.* Mrs. Charles W. Heaton, for instance, saw in the portrait, "a sweet but perplexing poem," and a visible embodiment of "the words of the preacher, 'vanitas vanitatum.' "[30] Mr. Frank Preston Stearns, after a passage on the "meaning" of the smile, dwells upon the sense of mystery in Leonardo's character, which is "expressed without reservation" in this picture.[31] Elbert Hubbard, in one of his *Little Journeys,* brought in the words of the Preacher, as well as those of Walter Pater, added Cleopatra to Leda, Helen, and Saint Anne, and filled three pages with an eloquent description of a smile which he called "ineffable."[32] Mr. George B. Rose expressed the usual thoughts about the "inscrutability" of the smile, "a smile that is only on the lips, while in the eyes there are unsounded depths. Vainly we question her; like the Sphinx her riddle eludes us still."[33] Mr. Edward McCurdy, after an analysis of the details of the portrait, concludes, "Thus, on the very confines of fantasy, and girt

[29] Walter Pater, *The Renaissance,* 1st ed., 1873. The essay itself was first published in the *Fortnightly Review,* Nov. 1869, pp. 494 ff. Donald A. Stauffer, in an interesting article, *Monna Melancholia* (*Sewanee Review,* XL, 89 ff.) gives reasons for believing that Pater had never seen the original of the *Mona Lisa* and had superimposed Dürer's *Melancholy I* upon it in his memory. For intimations of an influence of Gautier on Pater through Swinburne, called to my attention by Professor Meyer Schapiro, see Louise Rosenblatt, *L'Idée de l'art pour l'art etc.,* 1931, p. 195.

[30] *Leonardo da Vinci and his Works,* 1874, p. 52.

[31] *The Midsummer of Italian Art,* 1895, p. 60. Though the Notebooks had not as yet been published when Mr. Stearns's book appeared, the *Treatise on Painting* alone might have shown him that Leonardo was enamored more of precision and clarity than of mystery.

[32] *Little Journeys to the Homes of Eminent Artists,* X, no. 2, pp. 46–50, (Feb. 1902). Hubbard's opinion of the picture may not seem important; but he was considered a great authority on "culture" by the general public of his day. The circulation of his *Little Journeys* was always large and his writings must have been the source of the aesthetic ideas of many unschooled Americans.

[33] *The World's Leading Painters,* 1912, p. 50. In a similar vein Laura Spencer Porter conveyed to the ladies of America the "meaning" of the *Mona Lisa* in the *Woman's Home Companion,* April, 1914, (XLI, p. 54.)

about with suggestions of strange lights and furtive shadows, he has created in this portrait of Madonna Lisa, third wife of a Florentine official, a myth of the embodiment of which men dream as of the eternal enigma of womanhood."[34]

III

From Gautier and Pater, as is clear, runs a tradition which is the very opposite of that started by Vasari. Whereas the Italian biographer and critic chiefly saw in the *Mona Lisa* a wonderful technical feat, the reproduction of a natural object, the French and English "aesthetes" saw it as a hieroglyph which required not simply contemplation but deciphering. It would appear to have become second nature to think of a picture—at least of this picture—as something of a rebus, a symbol whose meaning could be discovered only by a critic's intuition. That this school of writers attributed their theory of artistry to the artists whose works interested them need surprise no one. Critics are in the habit of reading an artist's mind.

This habit became strengthened when the psychology of Sigmund Freud achieved popularity. The nineteenth and twentieth centuries have been noteworthy, among other things, for a peculiar paradox: a combination of great scientific accomplishment with anti-intellectualism. Early in the former century, Schopenhauer began to argue that the understanding was created by the will to serve its own ends, an argument which he sought to deduce from Kantian principles. These ends, however, were not those of Kant's Practical Reason; they were, on the contrary, purely biological; and it was easy for Schopenhauer's successors to identify them with sexual ends. An artist, according to Freud, is a man whose sexual frustrations are released symbolically in pictures or statues or other works of art. Appetites which would never pass the Censor if expressed in their true nature, are permitted to appear in disguise.

As is well known, according to this theory the fundamental appetite of the human male is his love for his mother, known as the Oedipus Complex. Since incest in most Occidental society is not encouraged, the Oedipus Complex can only be released through art,

[34] *Leonardo da Vinci*, 1904, pp. 115 f. It is interesting to observe that James Jackson Jarves, the American collector and critic, who alone of the writers cited—and many others not cited—knew the Italian painters of the Renaissance intimately, was almost unique in his time in continuing the Vasari tradition rather than what we have called the Romantic. See his *Art Studies of the Old Masters of Italy*, 1861, I, p. 400.

and hence a Freudian critic will be likely to see in a picture a symbol of the artist's passion for his mother. Here, it will be observed, the critic assumes that the artist is not communicating something to the observer—he is really concealing something from the observer—but unconsciously expressing something of himself. When this something is revealed, it does not mean that the picture will be liked any the more; no standard of aesthetic judgment is implied in the psychoanalysis of a work of art. But it is clear that what mainly interests a Freudian, in any such work, will be the discovery of the unconscious motive. Freud's interpretation follows.

> It was quite possible that Leonardo was fascinated by the smile of Mona Lisa because it had awakened something in him which had slumbered in his soul for a long time, in all probability an old memory.[35] This memory was of sufficient importance to stick to him once it had been aroused; he was forced continually to provide it with new expression. The assurance of Pater that we can see an image like that of Mona Lisa defining itself from Leonardo's childhood on the fabric of his dreams, seems worthy of belief and deserves to be taken literally.
>
> Vasari mentions as Leonardo's first artistic endeavors, "heads of women who laugh." The passage, which is beyond suspicion, as it is not meant to prove anything, reads more precisely as follows: "He formed in his youth some laughing feminine heads out of lime, which have been reproduced in plaster, and some heads of children, which were as beautiful as if modeled by the hands of a master. . . ."
>
> Thus we discover that his practice of art began with the representation of two kinds of objects, which would perforce remind us of the two kinds of sexual objects which we have inferred from the analysis of his vulture phantasy. If the beautiful children's heads were reproductions of his own childish person, then the laughing women were nothing else but reproductions of Caterina, his mother, and we are beginning to have an inkling of the possibility that his mother possessed that mysterious smile which he lost, and which fascinated him so much when he found it again in the Florentine lady. . . .[36]

Not only is Freud able to construct a part of the hidden life of Leonardo from the *Mona Lisa,* he is also able to build up the life of the artist's mother. Since she was not married to Piero da Vinci, she was forced to "compensate herself for not having a husband."

[35] According to Vasari, the smile had to be artificially produced and preserved.

[36] Sigmund Freud, *Leonardo da Vinci,* 1916, pp. 85 ff. There is no objective evidence that Caterina resembled Lisa, in smile or otherwise.

In the manner of all ungratified mothers she thus took her little son in place of her husband, and robbed him of a part of his virility by the too early maturing of his eroticism. . . . When in the prime of his life Leonardo re-encountered that blissful and ecstatic smile as it had once encircled his mother's mouth in caressing, he had long been under the ban of an inhibition forbidding him ever again to desire such tenderness from women's lips. But as he had become a painter he endeavored to reproduce this smile with his brush and burnish all his pictures with it, whether he executed them himself or whether they were done by his pupils under his directions, as in Leda, John, and Bacchus.[37]

The way was now open for further embroidering on this psychological background, and critics were not slow to follow it. Pictures became clues to the subconscious labyrinths of an artist's mind. Regardless of the fact that this particular picture seemed to have been painted as a portrait, which might lead one to suppose that its appearance was to a large extent determined by the attributes of the woman who sat for it, its main interest was now held to lie in what it could tell us about the man who made it. This shift in critical attention was the kind of reversal of opinion best illustrated in the Hegelian dialectic. Whereas in Vasari the picture was considered with reference to its closeness to the objective world of nature, in Freud it is considered as a disclosure of the most intimately subjective world, the so-called Unconscious. But since the world which it reveals can be known only by means of a theory which is applied to the particular object, rather than one which has been deduced from it, the critic has only to make up his mind what was in the artist's Unconscious and then discover it spread out before him in the picture.

One finds a still more remarkable example of this in the volume written on our artist by Rachel Annand Taylor, *Leonardo the Florentine*. For her the *Mona Lisa* is a phase in Leonardo's transition from concealment to avowal of his homosexuality. It is, she says,[38] "as if he were afraid to see his Narcissus except in a disguise." Presumably when he painted his Saint John, he was no longer ashamed to see his Narcissus. But even if he were not, it is hardly likely that he painted the picture in order to inform the world that he had conquered his shame. This becomes doubly true if one accepts the Freudian theory that art is always a symbolical rather than a literal satisfaction of repressions.

[37] *Ibid.*, p. 91 ff.

[38] Rachel Annand Taylor, *Leonardo the Florentine*, 1927, esp. pp. 350–354. Only one who has gone through the whole of this book can get its full flavor.

Happily, we are not engaged in an examination of Freudianism. Our purpose is simply to indicate how it reoriented aesthetic comment on this picture in the twentieth century. A writer now feels it possible to assume that a painter is painting for himself rather than for an observer, and that, if an observer should present himself before a picture, he should find in it what the artist himself concealed in it. But since only initiated Freudians know what is concealed in pictures, the uninitiated observer fails to see what the picture really is, or "means." He is in the position of a European ignorant of Chinese looking at Chinese characters and thinking they are merely patterns.

If the *Mona Lisa* at the present time is considered old-fashioned, that is probably to be attributed more to the writings of the Gautier-Pater school than to those of the psycho-analysts. Leonardo himself is far from old-fashioned; but it is now the scientific and philosophical Leonardo rather than the artistic. This paper is not concerned with the decline of interest in the painting, but we may be permitted to suggest that M. Paul Valéry is probably right in saying that the association of "mystery" with the picture has had more influence than any other one thing in disgusting people with it.[39]

The tendency in the criticism of painting from about 1910 to the beginning of sur-realism has been technical. It has consisted largely in studies of form, color, drawing. Only since Marxian criticism became fashionable has there been much attention paid to subject-matter. But in such criticism little is said of adequacy of representation—fidelity to "nature"; the critic is concerned only with the "social significance" of the work of art. Hence to such critics, the *Mona Lisa* would have no great interest, unless, perhaps, as an illustration of the rise of the middle class, for the lady so carefully portrayed was probably a *bourgeoise*.

It may not be inappropriate to terminate with a celebrated passage from the artist's note-books about the portraiture of women.

[39] See his *Leonardo da Vinci*, 1929, p. 58. For other hostile criticisms of this celebrated picture, see Berenson's *The Study and Criticism of Italian Art*, pp. 3 f.; A. C. Barnes, *The Art in Painting*, 1925, p. 368; P. Dearmer, "Leonardo da Vinci, a Criticism," *Contemporary Review*, Vol. 135 (1929), p. 217. The Italian Futurists, in their campaign to liberate Italian art from the museum-pieces, quite naturally attacked it. A good example may be found in Soffici's *Giornale di Bordo*, 1915, p. 147: "In tram.—Vedo scritto su un muro a grandi lettere bianche su fondo blu: GIOCONDA: ACQUA PURGATIVA ITALIANA. E piu giù la faccia melensa di Monna Lisa. Finalmente. Ecco che si comincia anche da noi a far della buona critica artistica."

"Women," Leonardo says, "should be represented in modest attitudes with legs close together, arms folded, and their heads low and bending sideways."[40] The head of La Gioconda is not bending sideways, but otherwise the precept appears to be carried out in the painting. Add to it the memorandum on the importance of painting faces in a nebulous light, and you begin to have a clue to his method of portraiture. This will throw no light on what is "expressed" by the picture, nor is that, fortunately, our affair. We know that Leonardo was attracted by chiaroscuro and busy with the means of utilizing it. We may fittingly leave to psychiatrists the problem why such things interested him.

Our purpose in this paper has been merely to show how a given work of art may in different periods have essentially different content—and therefore be admired for different, if not for contradictory, reasons. If this instance is typical, it would appear that works of art which "withstand the test of time" change their natures as the times change. The work of art becomes thus the locus of a new set of values determined by the preconceptions or the predominant interest of the new critic or observer.

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[40] *The Notebooks of Leonardo da Vinci*, p. 240.

LA SIGNIFICATION ET L'ÉVOLUTION DE L'IDÉE DE PRÉCIOSITÉ EN FRANCE AU XVII^{e} SIÈCLE

By Daniel Mornet

L'histoire de la préciosité en France est fort mal connue et les explications qu'on en donne sont généralement des contre-sens. La faute en est aux railleries de Boileau et de Molière; elles sont spirituelles; elles prennent place dans des œuvres de talent ou de génie. On ne s'est souvenu que d'elles et c'est à travers elles qu'on a reconstitué une histoire de la préciosité qui n'a à peu près rien à voir avec la réalité.

On sait quelle est cette histoire traditionnelle, et fausse. Chez Mlle. de Scudéry, et autour d'elle, se seraient réunis des mondaines et des mondains avides d'élégance et de raffinements. Ils auraient inventé des délicatesses de sentiment et des subtilités de style qui auraient créé la préciosité. Les uns l'auraient fait avec plus de discrétion et moins de mauvais goût; les autres, plus pressés de se tirer de l'ordre commun, auraient tout de suite donné dans le ridicule, dans ce ridicule dont Molière se moque dans ses *Précieuses ridicules*. Sans doute Molière a la politesse de distinguer entre les bonnes et les mauvaises Précieuses et jure qu'il n'a voulu jouer que les mauvaises. Mais entre les unes et les autres il n'y aurait qu 'une différence de degré, ou même de nuance. D'ailleurs, dans son *Dialogue des héros de roman*, qui circulait en manuscrit dans les salons, c'est à la plus respectée des bonnes Précieuses, Mlle. de Scudéry, que Boileau s'en prend directement. Puis, par l'influence de Molière et de Boileau, la Préciosité, tuée par le ridicule, "diffamée," comme le dit Boileau, par un coup de l'art de Molière, aurait à peu près disparu. Il n'en serait demeuré que des "restes" que *les Femmes Savantes* auraient definitivement anéantis.

Dans la réalité les choses se sont passées tout autrement. La véritable préciosité ridicule date non pas de 1650–1660, mais de la fin du XVIe siècle jusque vers 1640. On sait que c'est une forme de goût non pas spécifiquement mondaine et française mais européenne, qui s'appelle concettis en Italie, euphuisme en Angleterre. Cette recherche d'un style alambiqué, de toutes les exagérations d'images et de sentiments, envahit la plus grande partie de la littérature française. Malherbe, lui-même, en est d'abord infecté et

ne s'en débarrassera jamais complètement. Les romans, notamment ceux de Nervèze et des Escuteaux entassent métaphores ridicules sur métaphores inextricables. La plupart des prédicateurs n'ont qu'un souci: faire admirer leur érudition et le tour galant qu'ils savent lui donner. Une partie de la poésie est consacrée à des madrigaux, impromptus, stances, élégies où il ne s'agit que d'exprimer des blessures, des agonies ou des délires d'amour dont chacun sait qu'ils n'existent pas. Il y a d'ailleurs des répertoires, des sortes de manuels du bien dire, du style précieux. Le plus célèbre fut celui de François Desrues, *Fleurs du bien dire recueillies ès cabinets des plus rares esprits de ce temps, pour exprimer les passions amoureuses tant de l'un comme de l'autre sexe; avec un amas des plus beaux traits dont on use en amour, rédigés en forme de lieux communs, pour s'en servir à propos.* La première édition est de 1595, mais l'ouvrage, sous des titres et avec des remaniements divers, a été quelque dix fois complété et réédité jusqu'en 1625. Exemple d'une lettre amoureuse: "Quelle divine clarté s'oppose si souvent à la tendresse et débilité de ma vue! seraient-ce point les doux agréables regards de ma dame ou plutôt ces adorables yeux de mon humaine déesse qui éblouissent aussi les miens par la vigueur de leurs vives étincelles? Astres jumelets, lumières fatales de ma vie, combien suis-je particulièrement obligé aux salutaires rayons que vous faites reluire sur moi, etc. . ." Ce style et ces gentillesses passent d'ailleurs, plus ou moins, dans la vie courante. C'est vers 1620 qu'on crée un nouveau genre littéraire, celui des Lettres. On s'avise qu'on peut mettre dans une lettre réelle les mêmes grâces et les mêmes raffinements que dans un roman ou un madrigal. Quand on est maladroit ou paresseux on a, à son service, quelque "bel esprit" appointé qui rédige ces lettres pour vous. Quand on a plus d'amour propre ou moins d'argent on fait emplette de quelque *Secrétaire,* d'un recueil de modèles de lettres où l'on trouve le "beau tour des choses." Le plus célèbre fut celui de Jean Puget de la Serre qui sous des titres divers, *Secrétaire à la mode, Secrétaire de la Cour,* etc. . . est constamment réédité de 1641 à 1660 (et même en 1680 et 1700).

On y trouverait abondamment le style de Cathos et de Madelon, d'Armande ou de Bélise de Molière. Mais on chercherait en vain ce style, celui dont se moque Molière à travers *les Précieuses ridicules* et *les Femmes Savantes,* dans les œuvres précieuses écrites entre 1650 et 1660. Sans doute c'est bien Mlle. de Scudéry qui a imaginé

la Carte du Tendre. Le sonnet à la princesse Uranie et l'épigramme sur un carrosse de couleur amarante que récite Trissotin et qui font se pâmer les Femmes savantes sont bien dans les œuvres de Cotin. Et l'on trouverait même dans les recueils postérieurs aux *Femmes Savantes* bien des poésies de même farine. Nous allons d'ailleurs y revenir. Mais il suffit de lire un ou dix recueils de vers, datés de 1650 à 1680, pour voir que ni le fond, ni le style n'ont plus rien de commun avec Nervèze, des Escuteaux, Desrues, La Serre ou dix autres. En réalité il existe bien, à partir de 1650 environ, un mouvement précieux. C'est alors qu'on invente le mot. On écrit avant *les Précieuses ridicules* et autour d'elles, dix ouvrages pour expliquer et juger cette préciosité. Mais quand on lit ces ouvrages on s'aperçoit qu'on y trouve beaucoup plus d'éloges que de critiques de la préciosité, que l'idée qu'on en donne est complexe et confuse, que le seul point sur lequel on s'accorde est que les Précieuses ne veulent pas ressembler à tout le monde. Quand on a démêlé œuvres et commentaires le rôle de la Préciosité apparaît comme fort différent de celui qu'on lui attribue traditionnellement.

Tout d'abord les salons précieux et les œuvres précieuses ont réagi contre la préciosité ridicule. *Ils ont fait œuvre classique.* Ils ont mis de la mesure et du bon goût à la place de l'emphase et du tarabiscotage venus d'Italie ou d'ailleurs et poussés jusqu'à l'absurde par les Desrues ou les Nervèzes. Quand Boileau s'élève contre le "faux éclat" et le "clinquant," contre ce qu'il y de mauvais goût dans le cavalier Marin, l'Arioste ou le Tasse, il est exactement d'accord avec l'immense majorité des Précieuses. Si l'on n'a pas la patience de relire un roman de Mlle. de Scudéry, il suffit de lire un volume de ces *Conversations, Nouvelles Conversations* qu'elle a en partie extraites de ses romans, ou bien de parcourir tel roman précieux de Mme. de Villedieu pour voir combien, par la clarté, l'aisance, la simplicité transparente du style, tout y est exactement classique. Si les *Conversations* avaient paru sans nom d'auteur, si on en ignorait l'auteur, il serait exactement impossible de deviner qu'elles sont l'œuvre de l'une de ces Précieuses dont Molière et Boileau ont voulu nous faire rire. En second lieu les Précieuses, une partie au moins d'entre elles, les "précieuses prudes" ont voulu imposer à l'opinion et à la littérature une conception nouvelle de l'amour. La vie, la réalité réduisaient le plus souvent le mariage à des combinaisons d'argent et d'influence où les jeunes filles étaient vendues comme des esclaves (l'expression

brutale est chez les Précieuses) ; l'amour n'était que la satisfaction d'un appétit sensuel et brutal. Les Précieuses ont voulu le spiritualiser. Elles ont même voulu qu'il fût tout spirituel. C'est le rêve de Mlle. de Scudéry. Pratiquement le rêve, qui fut parfois une réalité, permettait à la femme honnête presque toujours mal mariée (exceptionnellement à une vieille fille, comme Mlle. de Scudéry) de s'évader de l'esclavage sans manquer à la vertu. On ne doit à son mari que la fidélité corporelle, à la vertu que la chasteté. Pour le reste on est libre de donner son cœur à un ami qui ne demandera rien d'autre. Dans la pratique, sans qu'on puisse rien préciser, il est probable que cet idéal n'a pu avoir qu'un succès d'estime. Mais il a entraîné des conséquences qui sont, elles aussi, devenues une des formes essentielles du classicisme. En faisant jouer à l'âme un rôle qui, dans l'amour, méritait seul le nom d'amour, il a donné le goût d'étudier ce qui se passait dans cette âme. Il a développé ce goût de la psychologie, ce besoin d'analyse qui est le fond même de l'esprit classique, de la littérature classique. Une des occupations les plus goûtées des salons précieux ce sont ces *Questions d'amour,* mises à la mode par Mme. de Brégy, auxquelles les plus célèbres beaux esprits apportèrent des réponses ingénieuses. Ce fut à qui bientôt proposerait questions et réponses. Quand on les étudie on y trouve, bien entendu, des subtilités, de la mauvaise préciosité, mais aussi, justement tous ces problèmes du cœur qui sont, qui continueront à être le sujet des tragi-comédies, tragédies, romans proprement classiques. Enfin les Précieuses ont voulu, incontestablement, ne pas parler comme tout le monde. Mais il n'y en a pas qui ait parlé comme Cathos et Madelon ou comme pourrait le laisser croire le *Dictionnaire des Précieuses* de Somaize. Le mouvement d'épuration et de fixation de la langue tendait sans cesse à l'appauvrir et à la dessécher. Les Précieuses ont senti que cette langue "sans odeur ni saveur, comme la belle eau claire," excellente pour les raisonneurs ne pouvait satisfaire ceux qui veulent exprimer des délicatesses, plaire autant que convaincre. Elles se sont donc efforcées de donner à l'image, à une certaine sensibilité leur place dans le style. Et elles y ont parfaitement réussi. La plupart des tours et des images précieux qui ont été réellement et sérieusement employés, qui ne sont pas des plaisanteries ou des caricatures du style précieux, sont entrés dans la langue et Molière lui-même en a employé un assez grand nombre.

Il reste cependant que le Sonnet et l'épigramme de Trissotin, ridiculisés par Molière, sont bien de Cotin, que Cotin fait très bonne figure dans certains salons précieux. Ce ne serait rien, s'il n'y avait que ce mauvais goût de Cotin. Mais on trouverait bien d'autres madrigaux, sonnets, impromptus et stances tout aussi ridicules jusqu'à la fin du XVIIe siècle. Les thèmes les plus artificiels de la poésie et de l'esprit précieux continuent à être repris par toutes sortes de beaux esprits: par exemple celui du *Bel œil malade,* de *la Belle matineuse* (une belle en se levant et paraissant à sa fenêtre éclipse le soleil levant); Molière s'est moqué de la Carte du Tendre; il y a une douzaine de cartes et d'allégories du même genre avant les *Précieuses ridicules;* mais il y en a davantage après *les Précieuses,* et même après *les Femmes Savantes,* jusqu'à la fin du siècle. Une des conventions les plus insupportables de la poésie précieuse est celle des "mourants" c'est-à-dire de ces poètes qui, comme le dit Boileau, veulent

> Pour quelque Iris en l'air faire le langoureux
> Et toujours bien mangeants meurent par métaphore.

Or il y a des poèmes ou des romans mourants jusque vers 1680 et même jusque vers 1700. Quand on étudie non pas les chefs-d'œuvre mais l'ensemble de la littérature on est frappé de voir que les critiques de Molière et de Boileau ont été comme si elles n'existaient pas. C'est ce qui explique que Molière ait écrit *les Femmes Savantes* après *les Précieuses;* que La Bruyère ait fait le portrait de deux précieux, Acis et Cydias, que Marivaux ait écrit deux ou trois ouvrages ou parties d'ouvrages contre la préciosité (*le Don Quichotte moderne* [s'il est de lui], *Pharsamond, la Voiture embourbée*). Certains romans de Mme. de Villedieu et de bien d'autres, jusque vers 1680, sont fidèles à toutes les conventions galantes des romans de Mlle. de Scudéry: *les Annales galantes de la Grèce, les Galanteries grenadines* etc. . . nous peignent des grands seigneurs de la cour qui savent filer le doux, le tendre et le passionné, selon toutes les règles de la "belle galanterie," qui sont à la fois des chevaliers errants, des héros qui ne vivent que pour servir les belles et qui savent rimer des madrigaux, écrire des lettres "agréables" comme s'ils avaient cultivé, dans les salons et à la cour, l'honnêteté et la politesse. Il ne serait pas difficile de trouver dans les œuvres des poètes à la mode et dans ces Recueils de "pièces galantes," qui sont en vogue plus que jamais, une centaine de pièces qui pourraient être récitées

par Trissotin aussi bien que celles de Cotin. Et nous avons dit que les Cartes et allégories diverses (guerres d'amour, contrats d'amour, guerres littéraires) ne cessent pas d'être publiées aussi abondamment qu'au temps de la Carte du Tendre. Seulement on voit cette préciosité évoluer peu à peu vers une forme qui, elle, deviendra constitutive de l'esprit français.

Le principe n'a pas changé. Ce principe est qu'on a le droit et même le devoir de ne pas parler et de ne pas écrire seulement de la façon la plus raisonnable et la plus naturelle. Assurément ceux qui vivaient à cette époque "classique" ne renient jamais ni la raison et le naturel, ni leurs conséquences, la simplicité et la clarté. Mais tous, mondains ou écrivains, proclament aussi communément et aussi fermément que ce n'est pas tout. Il ne suffit pas d'être d'accord avec la raison. Par surcroît, et tout autant, il faut plaire. "La grande règle de toutes les règles est de plaire." Sur ce point on voit s'accorder Racine, Molière, La Fontaine et tout le monde. Si bien qu'on proteste contre les règles, des règles qui voudraient être étroites et tyranniques, aussi souvent qu'on en fait l'éloge. Ce n'est pas en effet la raison seule qui donne les moyens de plaire, qui fait découvrir les "agréments." C'est bien plutôt un *je ne sais quoi* dont tout le monde parle, dont Boileau lui-même finira par convenir, dont on disserte à vingt reprises mais pour convenir qu'il est inutile d'en disserter, que c'est affaire de goût plus que de règles. Dans un salon ceux qui plaisent et qui réussissent ne sont ni les plus raisonnables, ni les plus vertueux ni même les plus naturels. Il n'en est pas autrement dans l'art.

La préciosité sera l'un de ces moyens de plaire. On s'efforcera seulement de l'épurer de plus en plus, de la mettre un peu mieux d'accord avec le bon sens et la simplicité. C'est-à-dire qu'on s'éloignera de plus en plus de l'ingéniosité trop alambiquée et des sentiments trop artificiels pour découvrir ce qui est tout simplement de "l'esprit" et qui va devenir une des préoccupations essentielles et l'une des qualités durables de la littérature du XVIIIe siècle. Le passage de la mauvaise préciosité à la préciosité spirituelle est très réel dans cette poésie des amoureux "mourants" dont nous avons parlé. Ils étaient ridicules et insupportables tant qu'ils feignaient de parler sérieusement et prétendaient qu'on les lût comme s'ils étaient sincères. Mais Mme. Deshoulières, Pavillon, Régnier-Desmarais et d'autres vont écrire, entre 1670 et 1700, des poésies mourantes qui sont d'un tout autre ton. Le mourant ou la mourante

chante son martyre et prévoit sa mort prochaine avec un sourire de bonne humeur. Il étale son manque de sincérité. Il nous demande, de toute évidence, de nous amuser avec lui. Bientôt même on se lassera du jeu. Au lieu d'écrire que l'on meurt d'amour en laissant entendre qu'on n'en a pas la moindre envie, on dira, tout uniment, qu'il est absurde de mourir d'amour ou même d'en souffrir et qu'il faut ne chercher dans l'amour que ses plaisirs et non ses peines. Le passage se fait même clairement au moment où Mme. Deshouliéres rime une ballade dont le refrain était: "On n'aime plus comme on aimait jadis" au temps des chevaliers ou de *l'Astrée*. Le duc de Saint-Aignan défend, dans une autre ballade, les amants du temps. Mais La Fare (à moins que ce soit Pavillon) répond qu'en effet on n'aime plus comme autrefois; les amants d'autrefois étaient des imbéciles à qui les dames demandaient une éternité de services avant d'accorder un seul baiser. Aujourd'hui on veut être payé comptant, et même par avance. Et c'est la sagesse.

Aussi, peu à peu, on voit se dégager de la préciosité l'esprit d'un Fontenelle, d'un Hamilton, d'un La Fare, d'un Regnier-Desmarais. Fontenelle est encore un précieux; et La Bruyère le lui reproche aigrement. Il y a encore de la préciosité chez Hamilton, du moins dans le style, et même parfois dans les *Mémoires du comte de Grammont*. Il y en a chez Regnier-Desmarais. Ils ont pourtant bien de l'esprit et du meilleur, même chez un poète oublié comme Regnier-Desmarais. Assurément la morale y a perdu. L'amour précieux a disparu, ses scrupules et ses dignités comme ses conventions et ses chimères. C'est le cynisme de la société du Temple, puis de la Régence. Mais c'est un cynisme élégant et spirituel. Ou bien c'est, chez Marivaux, les grâces trop coquettes mais toujours vivantes du marivaudage. Sans doute le goût du XVIIIe siècle pour l'esprit ne vient pas tout entier de la préciosité. Le comique de Molière, plus direct, né des choses et des caractères plutôt que du tour qu'on donne aux choses et de l'angle sous lequel on peint les caractères, y a joué son rôle. L'humour anglais, bien qu'il y ait un humour français, avant qu'on ait connu celui d'Outre-Manche, a quelque peu nourri l'humour de Voltaire ou même celui d'un Crébillon fils. Mais c'est bien, pour une large part, de la vie mondaine et de la préciosité évoluée qu'est venu le goût français de cacher même ce qui est profond, même ce qui est triste sous le piquant d'un sourire de bonne compagnie.

Université de Paris

NOTES AND DOCUMENTS

LEIBNIZ'S PROJECT OF A PUBLIC EXHIBITION OF SCIENTIFIC INVENTIONS

By Philip P. Wiener

The following unfamiliar fragment of Leibniz's[1] illustrates an aspect of his thought often inadequately emphasized in textbooks of the history of philosophy. Along with his recognized interest in pure logic, mathematics, and *a priori* metaphysics and theology, he was, as this text shows, as zealous as any Baconian for the promotion not only of empirical investigations but also of their mechanical applications, and for the diffusion of knowledge of these and enthusiasm for them among the general public. The project here outlined was not, indeed, unrelated to current tendencies of the period. More or less "scientific" museums were in the seventeenth century coming into fashion,[2] and in a number of European cities those maintained either by princely houses or by private naturalists or other *savants* were among the show-places visited by educated travellers. Such were the museum of the Settalas, father and son, in Milan; that of Berend Ten Broeke (Bernardus Paludanus, 1550–1633) at Enkhuizen in Holland; Kircher's famous museum,

[1] *"Drôle de pensée touchant une nouvelle sorte de* REPRESENTATIONS—(*plustot Académie des Sciences, Septembre, 1675*)." Edited by Dr. Ernst Gerland in Abhandlungen zur Geschichte der Mathematischen Wissenschaften mit Einschluss ihrer Anwendungen, begrundet von Moritz Cantor, XXI Heft (Leipzig, Teubner 1906): *Leibnizens' Nachgelassene Schriften physikalischen, mechanischen und technischen Inhalts.*—Technischer Teil, Anhang 134. The French *ms.* of Leibniz is apparently in bad condition, and some of Dr. Gerland's readings may be questionable. Several of the discoveries and discoverers mentioned by Leibniz await identification from historians of science. The translator has indicated his own emendations of Gerland's notes (otherwise marked E. G.) by suffixing his initials (P. W.), and has omitted some of the text and some of Gerland's notes. Professor A. O. Lovejoy has in the introduction briefly indicated the historical background of Leibniz's idea and its distinctive place among similar projects or enterprises, and has added some footnotes.

[2] The history of their development has been told with admirable learning by David Murray, *Museums: Their History and Use*, 3 vols., 1904, especially Vol. I.—There were already being written, by the last quarter of the century, books about museums and their history; D. G. Morhof in his *Polyhistor*, 1688, mentions five such *tractatus, e.g.*, a work entitled *Unvorgreifliches Bedencken von Kunst- und Naturalien-Kammern insgemein* (apparently 1674); *op. cit.*, 1732 ed., II, p. 132. Morhof himself shared the enthusiasm for museums: "as in acquiring knowledge of the sciences we have need of books, so in experimental natural science we have need of this one book [*i.e.*, nature] the epitome of which can be furnished for us by a *Museum rerum naturalium*. In providing these both men of learning and entire societies have been solicitous, and there exist not a few of them in various places which have been brought together with no small labor" (*ibid.*).—A. O. L.

visited by Evelyn in 1644, and bequeathed in 1680 to the Jesuit College in Rome; and the Tradescants' "Ark" in London, "considered to be the most extensive collection in Europe at the time," which, purchased by Elias Ashmole in 1659, became the nucleus of the Ashmolean Museum.[3] Many of these were chiefly or solely collections of "natural" rarities (*rariora naturalia*), rather than of recent inventions and discoveries, but examples of the latter, in some cases, found place in the collections.[4] Leibniz's project, therefore, was not without precedent; but it is distinguished by its special emphasis on the comprehensive exhibition of recent progress in science and the practical arts in all countries, and by the popular appeal at which he aimed. And the text shows, in the originator of the Calculus and the author of the *Monadology*, the talents of a great showman; like the director of a latter-day World's Fair, he shrewdly insists upon the indispensability of amusements and spectacles (including seventeeth-century equivalents of moving pictures), and even gambling rooms, in order both to lure the multitude to the scientific and technological exhibits and to increase the revenues of the enterprise. He hoped, it will be noted, that the exposition would be so successful that it would become permanent, and would develop into a self-supporting "academy" for the encouragement and prosecution of further investigations and inventions. The Paris *Académie des Sciences* (1666) and the Royal Society (1662) had already been established, but not as outgrowths of popular exhibitions. The Berlin *Akademie der Wissenschaften* was founded nearly thirty years later, upon a quite different plan drawn up by Leibniz; but his "odd idea" of 1675 appears to have been the germ of his own conception of such an institution.[5]

[3] For all of these, with citations of contemporary references, see Murray, *op. cit. Cf.* also R. T. Gunther, *Early Science in Oxford*, 1925.—A. O. L.

[4] The Settalas' museum is said also to have included *artificia rariora;* Kircher's is described by Evelyn as containing "several mechanical engines, . . . perpetual motions, catoptrics, magnetical experiments, modells, and a thousand other crotchets and devices"; the Tradescants' appears to have shown some specimens of industrial arts; and the Museum of Paludanus is said by a contemporary to have caused a traveller to compose "this following Epigram *ex tempore:*

Orbe novo et veteri rarum et mirabile quicquid
Dat natura parens, artificisque manus,
Una Paludani *domus exhibet* . . .

In the old world or new what wondrous thing
Did art to light or nature lately bring,
This *Paludanus* house doth show . . ."

(Thomas Powell: *Humane Industry: or, a history of most manual arts, deducing the original, progress, and improvement of them.* London, 1661, p. 188. In the Library of Congress.)—A. O. L.

[5] Francis Bacon's *New Atlantis* (1627) was, as Sprat's *History of the Royal Society* amply proves, the fore-runner of the Royal Society, and, as Dean Marjorie Nicolson suggests, undoubtedly exerted an influence on Leibniz's composition of the following fragment.—P. W.

(Translation)

An Odd Thought Concerning a New Sort of Exhibition (or rather, an Academy of Sciences; September, 1675).

The Exhibition which took place at Paris on the river Seine, of a Machine for walking on water,[1] gave birth in me to the following thought. However odd the idea may appear, it could not fail to be of importance, were it carried out.

Suppose that some persons of means with an interest in curiosities, especially in machines, should agree to have public expositions made of such things. To this end, it would be necessary for them to raise a fund in order to meet necessary expenses. . . .[2] It would be all the better if one

[1] Daniel Schwenter (*Deliciae physico-mathematicae. Mathematische und philosophische Erquickstunden, darinnen 663—Kunststücklein, Auffgaben und Fragen aus der Rechenkunst, Lantmessen, Perspectiv, u.s.w. allen Kunstlieben zu Ehren Nuss.* Nürnberg, first edition 1636, second 1651) had described and illustrated by diagrams in a rather quaint and amusing fashion an invention for walking through water (Die XV Auffgab: Des Frantz Kosslers Lufft-und Wasser harnisch zuzurichten, pp. 464–469). The diagrams show a cross-wise leather harness on a wooden buoy, and a hunter with an air-inflated bag-pipe affair around his waist (*Windhosen*), winged paddles around his ankles (*Flossfedern*), and gun and grouse on his shoulder, marching waist-high through water and appearing quite confident. Schwenter claims (p. 469) that "mit dergleichen Windhosen solle Königliche Majestat zu Dennemarck mit einen Hofdiener eine ganze Meil über die offenbare See gegangen seyn." For other seventeenth century texts which aimed at the diffusion of the growing sciences as both useful and entertaining concerns, see Leurechon: *Mathematical Recreations; or a Collection of Many PROBLEMS Extracted out of the Ancient and Modern Philosophers: As, Secrets and Experiments in Arithmetick, Geometry, Cosmography, Horologiography, Astronomy, Navigation, Musick, Opticks, Architecture, Statick, Mechanicks, Chymistry, Water-Works, Fire Works,* etc. *not vulgarly manifest till now.* Written first in Greek and Latin, lately (1627) compiled in French by Henry Van Etten and now in English, with the examinations and augmentations of divers Modern Mathematicians. London, 1674. Also Ozanam: *Récréations Mathématiques et Physiques,* Paris, 1692. It is very likely that Leibniz was acquainted with at least one of these texts. Charles Hutton in the Preface (pp. IV–VI) of his English version (1803) of the Montucla's edition of Ozanam points to the Greek Anthology for "the first example of these mathematical amusements," and says that "Bachet de Méziriac, a celebrated algebraist, who wrote a learned Commentary on Diophantus, was induced to collect a great variety of questions on numbers, which he published in 1626 under the title of *Problèmes plaisans et délectables sur les Nombres.* This book, next to the problems of the Greek Anthology, laid the foundations for all the Mathematical Recreations that afterwards appeared more or less extensively, and in different languages." Thus the history of the idea of science as a form of entertainment apparently remains to be investigated.—P. W.

[2] Leibniz here names several prominent members of Louis XIV's court who might be induced to advance the money.—P. W.

could dispense with the great noblemen, even with persons powerful at court; and it would be well to have private individuals able to defray the necessary expenses. For a powerful nobleman would monopolize the business when he found it successful. If things went well, one could always have protectors at court.

Beside the persons capable of defraying the expenses, we should also need persons who could constantly invent new things. But as too many would give rise to disorders, I believe that it would be better to have no more than two or three directors who would employ all others and determine the conditions for certain exhibitions, limiting them to a certain period or to as long a period as the principals desire, or until a certain sum of money supplied by them had been repaid. The persons to be employed should be painters, sculptors, carpenters, watchmakers, and other such folk. We may add gradually mathematicians, engineers, architects, boat-builders, entertainers, musicians, poets, book-binders, typographers, engravers, and others.

The exhibitions would include Magic Lanterns (we might begin with these), flights, artificial meteors, all sorts of optical wonders; a representation of the heavens and stars and of comets; a globe like that of Gottorp at Jena; fire-works, water fountains, strangely shaped boats; Mandragoras and other rare plants. Unusual and rare animals. A Royal Circle. Figures of animals. Royal Machine with races between artificial horses. Prize for Archery. Exhibitions of battle scenes. Fortifications built of wood. On an elevated stage, representations of charity, cruelty,—etc.—all in imitation of the maker of the art,[3]—things that I have seen. An instructor in fortification would explain the use of all war games. Infantry drill of Martinet. Cavalry exercise. Naval combats in miniature on a canal. Extraordinary Concerts. Rare instruments of Music. Speaking trumpets.[4] Counterfeit gems and jewelry.

The Show could always be combined with some story or comedy. Theatre of nature and of art. Swimming. Extraordinary rope-dancer. Perilous leap. Show how a child can raise a heavy weight with a thread. Anatomical theater followed by garden of medicinal herbs, laboratory. . . .[5] For besides public exhibitions there will be private ones such as small adding machines,[5a] in others Pictures, Medals, Library. New experiments on water,

[3] The meaning here is obscure.

[4] The speaking-trumpet was apparently, in the 1670's, a much talked-about instrument, its invention being in dispute between Sir Samuel Morland (*An Account of the Speaking-Trumpet,* 1671) and Kircher. See Beckmann, *History of Inventions,* 1877, I, pp. 93–102.—A. O. L.

[5] Text obscure; Prof. Morris R. Cohen has indicated that an anatomical theatre and herbarium had existed in 1550 at the University of Padua.—P. W.

[5a] Leibniz himself had invented a multiplying machine about 1671. *Cf. A Source Book in Mathematics,* edited by D. E. Smith (1929), pp. 173–181. Pascal had constructed the first adding machine (1642), but Leibniz says he did not know of it in 1671 (*ibid.,* p. 174).—P. W.

air, vacuum: for the large exhibitions, one would make use of Mons. Guericke's machine of 24 horses, etc., for the small ones, a strong globe.[6] Many things from Mons. Dalencé's establishment,[7] *item*, the magnet. Mons Denis[8] or Mons. ———————— would explain them. One would even distribute certain rarities,[9] *e.g.*, those pixtriques, etc. Operations of transfusion and infusion would be made.[10] *Item*, for holiday spectators, who would be told the weather for the next day, whether it will rain or not, by means of the little man in the cabinet of Father Kircher.[11] We will bring the man from England who eats fire, etc., if he is still alive. Through a Telescope[11a] we could show the moon at night along with other heavenly bodies. We could send for the water drinker.[12] We could test machines which would

[6] Otto von Guericke (1602–86) was Mayor of Magdeburg, (1646), famous for his public demonstration of two teams of horses which could not pull apart the hemispheres of a small hollow globe voided of air. "Otto von Guericke's globe" refers either to this hollow globe voided of air by the air-pump he invented (imitated by Robert Boyle), or to a sulphur-globe with which he was the first to create static electricity by friction and to make the earliest observations of the conduction of such electricity. (A. Wolf, *History of Science, Technology, and Philosophy in the Eighteenth Century*, 214–215; *cf. Source Book in Physics*, W. F. Magie (1935) p. 80; 393). Guericke had a good deal of correspondence with Leibniz, who denied the existence of the vacuum. *Cf.* Leibniz: *Sämtliche Schriften* 2.[1]—P. W.

[7] Dalencé was the author of *Traité de L'aimant*, 1687; *Traittez des baromètres, thermomètres et notiomètres*, 1688.—E. G. [According to Beckman (*ibid.* p. 95, f.n. 3) D'Alencé was accredited by Duhamel as the discoverer of the speaking trumpet.—P. W.]

[8] Denis Papin: amanuensis of Huygens in experiments on air-pump; author of *Experiences du vuide*, 1674. Denis Papin "had the idea of obtaining power on the air-pump principle, and had tried, or at least suggested, the use of either gunpowder or condensed steam for the purpose; but Hooke, we are told, regarded the whole scheme as impractical." (A. Wolf, *History of Science, Technology, and Philosophy in the Eighteenth Century*, Chapter XXIV, Technology, VII The Steam Engine, pp. 611–612). Papin had, along with Guericke and Boyle, also experimented on the intensity of sound in various densities of the media (*ibid.*, 175).—P. W.

[9] Here Leibniz wrote in the margin: "preferably different rooms like palace shops in the same house where private parties having rented the rooms, would show the rarities."—E. G.

[10] Leibniz appended a note to the effect that the Director's office could serve as a clearing-house for all exhibitions; by charging a fee that would go to the Academy, the latter would be self-supporting.—P. W.

[11] A weather-forecaster invented by Athanasius Kircher (1601–80), German mathematician and Jesuit; his *Polygraphia, seu artificium linguarum quo cum omnibus mundi populis poterit quis respondere* (1663), interested Leibniz in connection with his own attempts to invent a universal language.—P. W.

[11a] *Cf.* A. Favaro, "La invenzione del telescopio secondo gli ultimi studi," *Real istituto veneto Atti*, V, 66, pt. 2, pp. 1–54. Venezia, 1906.—P. W.

[12] Leibniz explains the trick in a note, by indicating the use of concealed tubes in the mouth and alimentary tract of the water-drinker.—P. W.

throw things exactly at a given point. Exhibits of the muscles, nerves, bones: *item*, machine representing the human body. Insects of Mons. Swammerdam, Goedartis . . . ,[13] Myrmeleon. Shop of *Mepitus Galinée* and *des Billets*.[14] Arts of Mons. Thevenot.[15] Amusing and colloquial disputes. Exhibit of *camera obscura*. Paintings which can be seen only with a . . .,[16] from one angle presenting one picture, from another, quite a different one, like that of a certain Mons. a l'isle, v.d.—farms as at Versailles on the edge of a Canal. Public diversions (such as) pictures on oiled paper and burning lamps or lanterns. There could be figures who could walk, with a little illumination inside them, so as to show whatever might be printed on the paper. For magic lanterns, there would be not only simple objects painted on something transparent, but also detachable moving pictures of very unusual and grotesque objects, which it would be possible to make.[17]

Ballets of horses. Races round a ring and Turkish head. Artificial machines, such as I have seen in Germany. Power of a mirror to kindle a fire. Gilgevis de Callinus. Chess game . . . showing men on a stage, as in Haychaffle. Pageant in the German style. Other sorts of elaborate games could be taught and performed.

[13] Since Swammerdam, who lived in Amsterdam 1637–80, and Leeuwenhoek both influenced Leibniz (*cf. Monadology*, 66) by their microscopic discoveries, Dr. Gerland thinks that Goedartis . . . (*ms.* torn) refers to Leeuwenhoek, the Dutch microscopist who lived in Delft 1632–1723. But it is more likely that "Goedartis . . ." refers to the Dutch naturalist and painter Goedaert 1620–68, author of *Metamorphosis et historia naturalis insectorum, cum commentario Jo. de Mey et duplici epist. appendice, una de hemerobiis, altera de natura cometarum*. Middelbourg 1662–67. A Dutch version appeared the same year (1662) called "Description of the origin, species, qualities and metamorphoses of worms, caterpillars, etc." Martin Lister translated the work into English and edited it, York, 1682. *Cf.* Michaud, *Dictionnaire biographique*, art. "Goedart." Also, Favaro (*op. cit. supra*, Note 11a, pp. 21 *ff.*)—P. W.

[14] Unidentified. Dr. George Sarton has suggested that names like these in the *ms.* refer perhaps to instrument-makers in Paris, who as a class were not considered worthy or respectable enough to be recorded by historians of science.—P. W.

[15] Thevenot, author of *Relations de divers voyages curieux*, maker of loud-speaking trumpets.—E. G. (See note 4 *supra*.)

[16] Ms. torn, perhaps "instrument."—E. G.

[17] Here Leibniz wrote in the margin: "I had almost forgotten that we might establish an Academy of games or more generally, Academy of pleasures. But I prefer the first name because it is more fashionable. There would be games of cards and of dice."—(Leibniz adds details of games to be played, admission tickets, etc.) "It would be, at the same time, a respectable [gaming] room as at Blyeme's." . . . "There would be several houses or Academies of this nature through the city. These houses or rooms would be built in such a way that the director of the house could hear and see everything said and done without any one perceiving him, by means of mirrors and openings, something that would be very important for the state and a species of political confessional." . . . (rest torn).—E. G.

Play an entire comedy with the amusing games of all sorts of countries. People would imitate these games at home. There might be in the building provision for a game of tennis, and for other games, inventing perhaps new sorts of useful games.

There might be established some training Academies and Colleges for youth: perhaps join them to the College of the Four Nations [in Paris]. Comedies of the styles, debates of each country, a Hindu comedy, a Turkish, a Persian, etc. Comedies of the trades, one for each trade, which would show their skills, peculiarities, jokes, master-pieces, special and ridiculous styles. In other comedies, Italian and French clowns who would perform their buffooneries. Flying dragons of fire, *etc.*, could be made of oiled paper, illuminated. Wind-mills, thin boards that can go against the wind, the chariot of sails from Holland or rather from China. Instruments that play by themselves. Shells, etc. Hauz's machine of an artificial cavalry and infantry in battle.[18] The experiment of breaking a glass by shouting. *Petter*[19] should come. Inventions of Monsieur Weigel.[20] Show the equality of the oscillations of pendula. (Here Leibniz adds: People at the Academy should be forbidden from swearing and blasphemy, for under that pretext, Academies of the sort we are describing have been put under suspicion. . . . The pretext would be met, were it to become fashionable to admire fine players or performers. And those who broke the rules should give something, not to the cards but to the house, for in this matter it would be to the advantage of those who play to observe the law. But if a troupe of players were in a rare case unrestrained, and disobeyed this law, admission to any house should be denied by simply excluding them. . . .[21]

[18] Leibniz's insert: "Palace and isle of magic. Theater made of oiled paper within a dark place."—E. G.

[19] "Petter"—unidentified. See *supra*, note 14.

[20] Erhard Weigel (1625–99). Professor at Jena from 1653 on. Author of a series of works whose titles aroused curiosity, *e.g.*, *Himmel-Spiegel* (1661), *Zeitspiegel* (1664), *Erdspiegel* (1665), *Vorstellung der Kunst und des Handwerks* (1672), *Neu erfundenen Reiserat* (1672), *Pendulum ex tetracty deductum* (1674), *Wirkliche Probe der Feldkutsche* (1674), etc.—E. G.

[21] Rules of playing and gambling follow, ending with the statement: "Gambling would be the finest occasion in the world for initiating a thing as agreeable and useful to the public as the present plan. For we must offer the public some bait, take advantage of its weakness and deceive it in order to cure it. Is there anything so just as making use of extravagance in order to establish order?

Games of "chasse passe" (pass the hunter). Map games. These things might be made part of comedies played by a performer. At the end the opera will be added to all this, along with many other things; pantomime in comedies in the Italian and German style would be of interest. When the curtain is down it would not be bad to know what to do in the interim. Something might be shown in the dark, and magic lanterns would be appropriate for that. The actions of these trans-

The use of this enterprise to the public as well as to the individual, would be greater than might be imagined. As to the public, it would open people's eyes, stimulate inventions, present beautiful sights, instruct people with an endless number of useful or ingenious novelties. All those who produce a new invention or ingenious design might come and find a medium for getting their inventions known, and obtain some profit from that. It would be a general clearing house for all inventions, and would become a museum of everything that could be imagined. A Menagerie. Simple machines. Observatory. Anatomical theater. Museums of rarities. All people with curious minds would write to it. This would be the way to spread these things abroad (*débiter les choses*). There would be added Academies, colleges, tennis courts and other games, concerts, galleries of paintings. Conferences and lectures.

The profit for the private individual would apparently be great. Optical curiosities would hardly cost much and would constitute a large part of these inventions. All respectable people (*tous les honnêtes gens*) would want to see these curiosities in order to be able to talk about them; and even ladies of fashion would want to be taken there, and more than once. There would always be an inducement to improve things further, and it would be a good thing if those who undertook it were assured of the project in other large cities[22] such as Rome, Venice, Vienna, Amsterdam, Hamburg, by persons enjoying privileges from kings and republics. It could even serve to establish everywhere an Assembly of Academies of Sciences, which would be self-supporting, and would not cease producing fine things. Perhaps some curious Princes and distinguished persons would contribute some of their wealth for the public satisfaction and the growth of the sciences. In short, everybody would be aroused and, so to speak, awakened; and the enterprise might have consequences as fine and as important as could be imagined, which would some day perhaps be admired by posterity.[23]

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parent marionettes might be represented by a few words or songs. Shows might be given of the antiquities of Rome, and others of great men. In a word, all sorts of things."—E. G.

[22] "Having a fund, there would be a perpetual income from interest and from other sources, such as the formation of companies for new manufactures."—Leibniz's marginal note.—E. G.

[23] At the end Leibniz added the following: "At the close a purchasing office would be added. A register of catalogs and other useful things. Bring together the Marionettes du Marmis and the Pygmies. Shadows might be added to these, either on stage or at the ends near the spectators, where there are lights, and little wooden figures, so agitated that they will throw their shadow against the paper in very startling and magnified proportions. But in order to prevent this shadow world from appearing all on one plane, resort to perspectives might bring about diminishing sizes of shadows. They will approach the center from the edge and that will make it appear as if they are coming forward from the rear. They will

Editorial Comment of Dr. Ernst Gerland (1906)

The foregoing sketch contains so much for the history of the natural sciences "made interesting," that it was included in this collection [of *Leibniz's Unpublished Physical, Mechanical and Technological Writings*] although its content belongs to the field of cultural history. Not a few of Leibniz's projected ideas which he calls "drôle" have been long since realized. . . . Like so many of Leibniz's ideas, those here expressed went far beyond his times, and were realized long after his death, some only in our day. More important still should we consider his inspired and constant vision of the general welfare, of constantly striving after the reunion of the individual arts, already splitting apart, into one whole in terms of which each distinct art can fully develop its useful work. This same basic idea kept the discoverer of the Infinitesimal Calculus working also to persuade the rulers of his time to establish Academies of the Sciences, and led him to become founder of the Berlin Academy.[24]

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increase in size because of their distance from the light, a thing easily managed. There will be no end of wonderful metamorphoses, perilous leaps, flights. Circle of the Magi who transform whoever appear into demons of hell. Then of a sudden, all would be darkened. The same trick could be produced by subduing all lights except that one alone which is near the movable little wooden figures. This remaining light with the aid of a Magic Lantern would throw against the wall admirably beautiful and moving figures which obey the same laws of perspective. All of this would be accompanied by song from below the stage. The little figures would be moved from below or by their weight, so that whatever is used to move them is invisible. Song and music would accompany everything."—E. G.

[24] How manifold Leibniz conceived the aims of such academies to be, can be seen by an extract from one of his letters to Prince Eugene, besieger of the Turks. (Guhrauer, *Gottfried Wilhelm Freiherr von Leibniz*. Breslau, 1846. Bd. II, 288). In this letter, the activities of academies of science extend to historical works and investigations of charts and manuscripts, a library for the newest publications in literature, a museum of coins and antiquities, a theater of nature and art, a chemical laboratory, an observatory, a shop for models and machines, a botanical garden, a museum of minerals and rocks, schools for anatomy and surgery, an annual physico-medical History of the Seasons and Statistics of the Interior, research-expeditions in the fields of art, nature and literature, salaries and encouragement of persons devoted to these tasks of research and discovery, prizes and gratuities to inventors.

BOOK REVIEW

FORCES IN AMERICAN CRITICISM: A STUDY IN THE HISTORY OF AMERICAN LITERARY THOUGHT. By Bernard Smith. New York: Harcourt, Brace and Co., 1939. Pp. x, 401. $3.00.

The past two decades have witnessed both a notable increase of interest in the history of American literature and a considerable insurgence against the traditional ideas which have long prevailed with regard to it. Under the influence of what may be broadly called the Anti-Puritan and the Marxian points of view, the rebels have protested either (1) against the "Puritanic," "Genteel," or "Victorian" subordination of literature to conventional morality or (2) against treating literature apart from the economic, political and social conditions under which people actually live. The slogan that literature should express "life" has been used so much by both groups that it has obscured the fact that the differences between them are in some respects greater than that which separates the second group from their supposed common enemy. Indeed, the Marxian group might well be called neo-Puritanic, since they are hostile to the idea of literature for the sake of enjoyment (no matter how refined) and insist that it must be judged not by purely aesthetic or artistic considerations but by the writer's conformity to the proper doctrine, which must now be politico-economic rather than, as formerly, politico-theological. And though Mr. Smith joins Freudians like Ludwig Lewisohn in the notion that the salvation of literature is to be found in greater freedom in dealing with sex, the main force of this book is directed against impressionists, expressionists, aesthetes and hedonists, as fundamentally undemocratic. It opposes Socialism to Bohemianism.

While neither in originality of thought nor in scholarly research does this history of American literary thought claim to be a major contribution, it represents the views of a spreading group and it touches on many ideas that are certainly in urgent need of more critical examination.

What is literature? What is the function of literary criticism? What are the requisites of a scientific history of literary thought? Some answers to these questions are involved in any history of American literary criticism.

I

Previous to the appearance of Parrington's vivid and stirring *Main Currents in American Thought*, which has strongly influenced Mr. Smith, the word "literature" had a fairly definite meaning among English-speaking people. It was generally synonymous with *belles lettres*, and did not at all extend to all the writings that specialists, according to Germanic use, refer to as the "literature" of a subject. It included poetry, novels, dramas, essays, biographies, and those histories which could be regarded as works of

art. It excluded official records, statistical or scientific reports, political, economic or theological books or pamphlets, unless they were written with a certain elevation of style that made them worth reading apart from one's agreement or disagreement with the views expressed in them. One does not have to accept Dante's Catholic philosophy to recognize with the atheistic Shelley that the *Paradiso* is great literature, whereas it still hardly occurs to anyone to maintain that every sound or correct manual on mathematics, astronomy, physics, chemistry, physiology or law is necessarily a work of literature. Parrington, however, was not only a professor of literature but even more an ardent devotee of Jeffersonian democracy; and so he wrote a book whose title and sub-title indicated two distinct interests which, despite his great literary gifts, he did not fully integrate. As a history of American thought it is obviously inadequate, failing to do full justice to the course not only of religious, scientific and philosophic but also of political and economic theory. And as a history of literature it is too much concerned with politics and too little with the appreciation of poetry, or the art of the novel or of the drama. The vigorous vitality which made Parrington's a great work despite its obvious limitations has not, however, been inherited by his imitators. Thus Mr. Smith fails to make up his mind consistently as to whether literature, like other fine arts, demands both special aptitudes and cultivation for its adequate appreciation as well as for its production, or whether the aesthetic point of view is to be utterly condemned as that of a privileged minority class. Thus he asserts that it is "in a small but intensely alive community" that "literature is created and assimilated" (p. 366), and he admits that the mass of the common people are at times even hostile to art and consider its enjoyment by the educated a vice (pp. 3 and 70). The masses, therefore, have to be educated by poetry and literature generally (p. 118), to be guided "away from grossness and cupidity towards spiritual grace" (p. 149). On the other hand, we have the rejection of the view that delight in literature may be an end in itself; and the quest for beauty in literature is condemned as "aloofness from common life," as "indifference to the fate of the community," as "involving a sense of superiority to the passions and ideals of the mass of men" (p. 359). The literary artist must be responsible to the electorate and be the conscience of society (p. 112). He should spread the democratic gospel (p. 184) on a materialist rather than religious basis (p. 112).

Carried to its logical conclusion, this would lead to the view that any proletarian novel, or for that matter any democratic pamphlet, is greater literature than the poetry of Homer, Spenser, Shakespeare, Goethe or Keats. But Mr. Smith has not the courage of his confusion, and does not deny the literary merit of Shakespeare, who certainly shows contempt for the lower classes whether they worship Caesar or rebel against the King of England. Indeed, we have the admission that some Tory critics have a finer ear for

poetry than some democratic ones. In the main Mr. Smith's standards are those of G. B. Shaw, who claimed that his plays, because they contained more social ideas of contemporary interest, were for that reason superior to Shakespeare's. This, however, ignores the distinction between the intrinsic and extrinsic values of literature. Ordinary social-problem plays such as Shaw's at best contain intimations as to how the general happiness might be increased, and they therefore lose their interest when conditions change, while great literature is in itself a permanent source of intense and ennobling enjoyment.

This brings us to the popular confusion between the idea that literature *does* express "life" and the view that it *should* do so. Marxian determinists often seem to be arguing that all literary or any other cultural activity of any period inevitably expresses the socio-economic life which conditions it, but also, that writers frequently fail to do this, and that those who exemplify such failure should be condemned as bad. But even apart from this, there is undoubtedly a widespread confusion in the use of the word "life" in this connection. Like so many other terms that have been used for honorific purposes, its denotation is extremely vague. In the strict sense of the word every writer except those who restrict themselves to inanimate nature deals with life. But obviously those who so eloquently insist that literature should deal with life do not use the word in its literal sense. What they really demand is that it should be concerned with the kind of life in which they happen to be interested. Men like Parrington are interested in Hamilton's reports on manufactures and the method of financing the United States, as an expression of his class bias. But a vast number of others are more interested in such matters as his affair with Mrs. Reynolds or his duel with Aaron Burr. Since none of us can be equally interested in all phases of life, an expression of one's consistent preference is legitimate, provided it does not set itself up as the only valid one, to be enforced on everybody. And here the democratic test of contemporary popular suffrage has no authority. The multitude votes for Longfellow or Ella Wheeler Wilcox or Harold Bell Wright rather than for Walt Whitman, Thoreau or Dreiser, and critics like Mr. Smith feel in no way bound thereby.

II

What then is the proper function of criticism? The currently popular notion shared by Mr. Smith condemns the criticism of the eighteenth and early nineteenth century as didactic and moralistic. He maintains that it was the aristocratic character of society that led to the conception of the critic as a censor, enforcing the proper moral and social standards on all who ventured to make their writings public. But he does not deny that the genuine critic must have both a widely varied and keen sensitiveness in the perception of what constitutes aesthetic or literary merit (pp. 358, 379). We must distinguish between criticism and pedagogy (p. 284), or, as Lowell said

a century ago, between singing and preaching. On the other hand, social democratic views lead our author to assert also the direct opposite (*e.g.*, pp. 219, 345). The ideal critic is a guide who influences social and political affairs, one "by whom we wish to be taught" (p. 219), who instructs the artist how his work should affect society (pp. 365–6). Mr. Smith is confident of the critic's ability to do this, to pass judgment on the *truth* of any writer's metaphysical, economic, political, or social historical views, because he has not the least doubt that by accepting Marxism the critic becomes a scientist (p. 386). To recognize the class-factor in culture is to achieve the highest merit that a critic can have (p. 301). But even if we were to grant that social-economic truth is the supreme test of great literature, it would not follow that we must accept Marxism as the final word of science. One may be a good literary critic and yet doubt whether Marx's theory of exchange value fits the facts of economics. One may even hold that history has stubbornly refused to live up to the prediction of Marx and Engels as to the elimination of the middle class or as to other inevitabilities which follow from materialistic Hegelianism. But it is not necessary to argue this. Mr. Smith himself at times recognizes that there are values permanent for all classes (p. 291), and that no matter how much society changes no class can (or should) throw away all the experience of the past (p. 286). Indeed, if social and economic changes wiped out all previous conditions, it would be impossible to explain how ancient literature could still be read and enjoyed. But to cap the climax we have the quotation from Marx himself that certain periods of highest development of art "stand in no direct connection with the general development of society, nor with the material basis and the skeleton structure of its organization" (p. 288).

Due consideration of this statement of Marx should lead to a recognition of the truth that the critic does well to concentrate on the content of the work of art before him and make explicit the significance implicit in it, so as to promote thereby a fuller and better appreciation of it, rather than to indulge in speculations (always more or less dubious) as to how the author came to write as he did.

III

During the nineteenth century the view became generally popular, and it is still current among some historians of literature, that belief in determinism is enough to make one "scientific." On the assumption that virtues and vices—presumably including literary ones—are "natural products like sugar and vitriol," Taine tried to derive and thus explain all English literature from the factors of race, climate and "the epoch." Mr. Smith is not so certain about climatic influence and hardly refers to race at all. But he stresses the bias of the ruling economic class of the time, as the determining cause at least of literary criticism, if not of poetry and fiction. The main

point is the assumption of a "modern fool-proof historical inquiry and explanation" (p. 262), that if we know a certain (small) number of social "forces," we can deduce or predict the form that literature will at any time take. This amounts to eliminating personal genius or, if you like, personal variation as a factor in literary history. Now we may well admit that to refer to the "genius" of any writer is at best but to point to some of his characteristics, not to explain their origin. But if any writer has distinctive individual traits it is well not to begin by denying their existence; and it is also necessary to recognize the strictly logical principle that laws alone can never be sufficient to "explain" any individual phenomenon. That which is common to a number of writers at a given period in any country cannot possibly account for the more important things in which they differ, such as that which distinguishes Emerson from other New England transcendentalists, or Poe from the other critics who wrote at the same time and who may have grown up under similar social conditions. A striking example of the disregard of this actuality is shown in Mr. Smith's over-confident rejection of the suggestion that personal temperament prevented Henry Adams from entertaining the Marxian point of view. The "scientific view" requires that this be explained only in terms of class bias. Now, it happens to be the fact that Henry's brother Brooks, belonging to the same social class and environment, did entertain the Marxian point of view as regards the development of law and other social phenomena. Indeed, did not Marx, Lassalle, Lenin and other revolutionary thinkers overcome the bias of the class into which they were born? Jefferson and Marshall were relatives who came from the same class—but how different their points of view! Any writer may be behind or ahead of his time.

The truth is that positivists generally have a very confused and inadequate view as to the kind of determinism required in scientific procedure in history or any other field. Scientific statements take the form of abstract laws asserting that certain classes of events or characters are connected with certain others according to relatively simple relations. This means that we must reject the view that everything is directly dependent on everything else. For there would be no point in saying that A depends on B if it were equally true that it depends on everything else in the same way. It is, therefore, not sufficient to assert that there must be a relation between the forms of literary expression and the kinds of economic systems. To prove that a direct causal relation prevails between the two surely requires more evidence than mere sequence or even correlation—though very little of the latter has actually been shown, and the specific instances of non-correlation are many and conspicuous. In any case, it seems, *prima facie*, far more plausible to suppose that what we call literary ability or genius is the resultant of so many factors that no one, and no small number of them, will carry us very far as a real explanation. It is curious that a Marxian and a materialist

should deny physiologic causes of, or predispositions to, the melancholy temperament (p. 187). Another such fundamental omission is the purely mental factor of imitation. We find, in fact, that literary fashions in this country, despite our War of Independence and differences of economic conditions, have followed in the main British and foreign patterns. Indeed, did not our predominantly agricultural West, according to Mr. Smith's own testimony, imitate the literary models of mercantile and capitalistically developed New England?

To challenge the assumption of direct causal relation (*i.e.*, that one is the necessary and sufficient condition of the other) is not to deny all connection whatsoever. But such connection may be indirect and complicated rather than direct and simple. It is highly improbable that any two Americans taken at random are absolutely unrelated (*i.e.*, have no common ancestor), if we take into account the thousands of generations in the course of human existence. But it does not follow that they are brothers or even first cousins. There is surely a connection between flowers and the soil in which they grow. But different flowers grow in the same soil, and the same kind of flower may grow in different soils.

It seems plausible to assume that certain social conditions will have some influence in determining what forms of literature shall become fashionable and thus be the objects of imitation. But that is quite different from being able to explain adequately why Simms and Poe, or Lowell and Emerson, came to write as they did. The phenomena of selection do not explain the causes of variation. It is also well to remember that to determine which modes or fashions did prevail, *e.g.*, to what extent transcendentalism was typical or exerted any general influence (p. 230), is a historical and statistical inquiry, and not to be disposed of by mere impressions.

Any sound history of literary criticism that can claim to be scientific or scholarly must necessarily conform to the general canons of history which distinguish it from mere speculation. It is not, therefore, sufficient to assume plausible principles and to deduce from them what must have happened. We must be careful to examine critically whether there is sufficient evidence that these things did happen. And here most Marxians are too devoted to their dogma to give a sufficient welcome to the truly critical spirit. They approach American history from the point of view of their leader's analysis of capitalistic production, whereas our country was up to the end of the nineteenth century predominantly agricultural and, because of the large supply of free or cheap land, without a landlord class, except for a time in the South. In their preoccupation with economics these literary historians leave out the most obvious intellectual influences which shaped the development of American criticism, such as the traditions in our schools and colleges. The Scottish philosophy, for instance, was taught during the nineteenth century in nearly all of our colleges and thus influenced various phases of

American thought. Kames's *Elements of Criticism* appeared in this country in more than 70 editions, and Blair's and Campbell's *Rhetorics* were used in almost all of our high schools. Hence, though economic conditions in America and Scotland were different, the canons of literary criticism were for a long time much the same. Again, the increase not only in absolute number but also in the relative proportion of high school and college graduates in our population has certainly had its effects on the standards of literary writing and criticism—probably more than any revolt against a parasitical aristocracy.

Mr. Smith follows the fashion set by Parrington and others of dividing the literature of our country into three periods, (1) the colonial and early national period, which he calls provincial and sometimes characterizes as classic, (2) the romantic period, and (3) the present realistic one. This raises the questions: What precisely do the terms classicism, romanticism and realism denote? Is there sufficient evidence that these represent three chronologically successive periods? And finally, is there sufficient evidence to show that changes from one to another period are the result of economic causes? In discussing any of these questions it is well to keep in mind that great figures in literature—Emerson, for example—have been claimed by classicists and romanticists as well as by realists. And Emerson felt free to criticise each of these schools; there was, in fact, in him something of them all.

Let us in the first place consider Mr. Smith's conception of romantic criticism. Among the romantics he includes the Transcendentalists, Prescott, Poe and a few other Southern writers; and it is rather hard to see what is common to all of them. He equates the romantic with the revolutionary attitude. It is the dream of the disinherited (p. 68) and is grounded in disappointment and anticipation. But was there ever a society in which men and women did not experience anticipation and disappointment? The fact seems to be that romances and romantic plays were read by the ladies and gentlemen in the French and English courts, while leaders of the romantic movement such as Burke and Friedrich Schlegel were definitely counter-revolutionary. And which of the romantics in the United States represented the lower classes? Certainly not those Mr. Smith mentions. Prescott and the transcendentalists belonged to the class that had dominated New England thought in the previous two centuries. Moreover, American eighteenth-century novels were certainly romantic, if that means ecstatic reference to the beauties of nature, the simple life, the humble people and the truths of the spirit (p. 28). And when Mr. Smith asserts that the time, place and circumstances explain these romanticists so well that little reference need be made to their cultural borrowings, he overlooks the fact that every phase of what he regards as the American romantic movement had its antecedents in England. Emerson's Neoplatonism, for instance, can be directly traced back to Cudworth and the Cambridge Platonists. And in considering

romantic literary criticism it is well to remember that Coleridge's *Biographia Literaria* was published in the United States in the same year as in England and was as frequently reprinted here.

Turning to realism we find that its distinctive trait, according to Mr. Smith, consists in dealing with the observable human scene (p. 182), and this he interprets in materialistic terms. Identifying science with materialism, he argues that realistic criticism must reject any considerations of the artist's aim (p. 283). But our author is too devoted to the democratic faith to carry out any such attitude consistently and he does not hesitate to praise writers for their benevolent aspirations.

We may well raise the question whether what is ordinarily meant by literary "idealism" and "realism" are in fact mutually exclusive, whether they cannot exist not only at the same time in different writers, but even in the same work. No work of art can fail to exercise a certain amount of selection and idealization of its material. Certainly it is difficult to see how any tests of realism which Mr. Smith uses can exclude an eighteenth-century novel such as DeFoe's *Moll Flanders* or Fielding's *Tom Jones*. (The morality of the latter is as wholesomely anti-Puritanic as any civilized modern could wish.) But we may waive this point. Let us assume that the realistic novel of the type of Dreiser's *American Tragedy* is a brand-new phenomenon. Is it to be explained by the rise to power of a new economic class? Curiously enough a similar phenomenon in Russia is expressly admitted to be due not to any economic change but to imitation. And certainly there is no evidence of the rise of any new economic class to power in America to explain the vogue of novels such as Mr. Dreiser's, or even the kind of criticism which Mr. Smith stands for. There is, to be sure, in our country today a much wider group of readers, but Mr. Smith does unusual violence to the facts when he contends that the average reader, meaning, I suppose, the most numerous class, prefers realism in fiction (p. 134). Most of the fiction in our popular journals, such as the *Saturday Evening Post,* or the novels most in demand in our public and private circulating libraries, are distinctly romantic in the sense that they deal with an imaginative realm to which men and women like to resort to escape the drabness of their daily routine. Mr. Smith and other moralists may contend that people ought not to do that, but there can be no denial that not only is this the actual preference but in some measure it always has been. Sherwood Anderson, generally regarded as a realist, has expressed it by saying: "The life of reality is confused, disorderly, almost always without apparent purpose, whereas in the artist's imaginative life there is purpose. There is determination to give the tale, the song, the painting, form—to make it true and real to the theme, not to life." "Realism, in so far as the word means reality to life, is always bad art—although it may possibly be very good journalism." For we must remember that human interest in a work of art depends not upon its photographic accuracy but upon many types of psychological effect on the mind of the reader.

It is interesting to note Mr. Smith's rejection of Frank Norris's own characterization of himself as a romantic. Norris quite definitely identified the romantic with that which is peculiar or special as opposed to the common, with the invisible as opposed to what is obvious. Thus, not the peaceable citizens of the West who are in the majority, but the local adventurers, the cowboys, miners and the like, are his deliberate choice. This, of course, is in line with the historic revolt of romanticism against the classic preoccupation with the universal elements in humanity. Mr. Smith justifies his characterization of Norris as a realist because the latter "sees more significance in reality than in any imaginary world," even though the reality is not the life of the common people. But is there no imagination in Norris's pictures? Norris certainly rejected Mr. Smith's test of literary reality, "the life of ordinary or recognizable men and women rather than unique or precious individuals" (p. 147).

Mr. Smith says very little about classicism. In the main he uses that term to denote the type of literature and criticism represented by Dryden, Pope, Addison, and Dr. Johnson, and he condemns the imitation of it in our colonial and early national literature as un-American. But literary nationalism is not only inconsistent with the emphasis on democracy and the class-struggle but ignores the fact that this Augustan literature showed not only French influence but also that, like most modern writing, it inherited the classic tradition from Greece and Rome. Until recently in America as well as in other countries, educated men had read Cicero and Horace, as well as Euclid; and this was true not only of the landed or mercantile aristocracy but also (in our country) of the sons of farmers and other youth of humble origin who worked their way through college. The truth is that the rise of the modern national state and even of the vernacular literatures did not completely destroy the cultural community of the West as embodied in Christianity and Hellenistic learning. Humanistic culture has never been purely nationalistic, any more than science has. To preach the sloughing-off of borrowed cultural traits would mean that the French should discard their language of the last fifteen centuries and go back to Celtic dialects.

In this connection it is worth while to note the close relation between romanticism and nationalism. In America, of course, the latter had its obvious beginning in our War of Independence, in natural pride and resentment against English assumption of superiority. This is clearly seen in the literature of the Revolutionary War and in the period immediately following, especially in the writings of Freneau and Joel Barlow. But later nationalism is also a revolt against the classic tradition of reason and humanity that we inherit from Greek and Roman civilization. Emerson in his protest against aping the past, in his insistence that we too are men and must express our own life, gave encouragement to this nationalism. Whitman asserted it more

stridently in his early writings, never tiring of contrasting American democracy with effete Europe. In Mark Twain's *Innocents Abroad* and other writings this often borders on the glorification of Philistinism. Against this shutting off America from the sources of universal culture, Lowell protested. Can't we in America appreciate Dante and Cervantes? The best part of world literature can be translated. It is true that there are things in the world about us which the Greeks and English did not know or treat of, but to be truly human does not mean to exclude what others have achieved. We should not ape English critics and approve everything they do, but neither should we approve everything because it is American. The romantic idea places emphasis upon local color, but Shakespeare can take his scene in Greece, Rome, Italy or in the never-never land as well as in Merry England. The great figures of literature, such as Job, Ulysses, Aeneas, King Arthur, Hamlet, Faust, Don Quixote, interest us not because they are national but because they are human. The emphasis on nationalism in literature, on local color to the exclusion of fundamental universal human traits, is in the end but a glorified provincialism.

In this connection, it would be highly praiseworthy if those who speak of the "genteel" tradition would vouchsafe some clearer indication of what they mean by that fashionable term. Mr. Smith speaks of it at times as if it began in 1815 as the reaction of a hereditary aristocracy against the business community (p. 41). But at other times he identifies it with the attitude of the middle class (p. 52) or with that of the mercantile group. The latter, however, came into power even before the Revolution, and was as strong in Philadelphia, Charleston, and New York, as in Boston, though the literary developments in these several centers were quite different. In any case, if we think of the "genteel" tradition as aristocratic, we are surprised to find the sentence: "genteel he was . . . nevertheless he was receptive to continental literature" (p. 268). Interest in continental literature was, certainly until recent days, confined to our upper classes.

On the other hand, so far as we have any indications of the specific traits ascribed to the genteel tradition in literary criticism, they are found in the colonial period as well as today. The obvious truth, indeed, is that the points of view of individual critics do not always represent the economic class from which they come. And Mr. Smith himself, who contends, in the main, that Marxism expresses the outlook upon life of the lower classes (p. 286) is forced to admit that most American workingmen are bourgeois in outlook (p. 287).

It would not be fair to say that this book represents the strongest case that can be made for economic determinism in literature. The adherent of the latter view may well reject Mr. Smith's assumption that criticism is more directly representative of or responsive to the general conditions of life than is fiction. They may point to the patent fact that those who read novels far outnumber those who read literary criticism, and those who write the latter

have been a more narrowly select class. It is also possible for those who believe in the social-economic interpretation of literature to pay closer attention to the actual history of the United States and to make more effective use of it. A Marxian need not follow Mr. Smith in ignoring the history of Carthage, Athens and Venice as well as of modern England, or in asserting that "the traditions of a mercantile community are incompatible with empire" (p. 266). But the outstanding fact remains that the diverse attitudes of literary critics do not correspond to successive forms of economic organization; and the case is obviously even weaker if we consider the divisions between rival contemporaneous schools. For no economic differences in origin or status separate the Neo-humanists from such writers as Spingarn, Mencken, and their followers. It is not good scientific method to reduce a wide range of very complicated and highly individualized phenomena to too simple a pattern.

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A History of Esthetics. By Katherine Everett Gilbert and Helmut Kuhn. New York: The Macmillan Company, 1939. Pp. xx, 582. $4.25.—Interpretations of esthetic theories in Greek thinkers through Plotinus, Augustine and Aquinas, the Renaissance (1300–1600), the 17th century and neo-classicism, the 18th century British, French and Italian schools, German romanticism and idealism, and the age of science.

Figures of Transition. A Study of British Literature at the End of the Nineteenth Century. By Granville Hicks. New York: The Macmillan Company, 1939. Pp. xv, 326. $2.50.—Morris, Hardy, Butler, Gissing, Wilde, Kipling.

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The Arts and the Art of Criticism. By Theodore Meyer Greene. Princeton: Princeton University Press, 1940. Pp. xxx, 690, including 300 illustrations. $5.00.—"Addressed to all critics and philosophers of art, all sensitive laymen and

creative artists, who feel the need for an analysis of the arts and the art of criticism which is at once empirical and theoretical; which studies the arts from the artistic point of view, yet with appropriate philosophic rigor; and which formulates concepts and principles universal in applicability, yet rooted in artistic fact."

THE PROSPECTS OF PHILOSOPHY. By John J. Rolbiecki. New York: Benziger Brothers, Inc., 1939. Pp. xiv, 161. $2.50.—A Catholic's defense of the historical approach to the systematic problems of philosophy, intended primarily for graduate students seeking subjects for dissertations.

THE IDEA OF A CHRISTIAN SOCIETY. By T. S. Eliot. New York: Harcourt, Brace and Co., 1940. Pp. vii, 104. $1.50. In these three lectures Mr. Eliot is concerned with "the organisation of values, and a direction of religious thought which must inevitably proceed to a criticism of political and economic systems."

POSITIVE DEMOCRACY. By James Feibleman. Chapel Hill, N. C.: University of North Carolina Press, 1940. Pp. xv, 256. $2.50.—"Because of its peculiar historical origins and development, democracy has acquired certain characteristics which have seemed essential to it. Their actual association has led to the common belief that democracy is necessarily nominalistic, irrational, negative, individualistic, liberal, capitalistic, and impractical. These characteristics are in part contradictory; their identification in theory is the result of a confusion of logic with history." The last chapter deals with the "Rational Democratic Ethics of Peirce."

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A CONCISE HISTORY OF ITALY. From Prehistoric Times to Our Own Day. By Luigi Salvatorelli. Translated by Bernard Miall. New York: Oxford University Press, 1940. Pp. 688. $5.00.—"The author characterizes each epoch of Italian history and relates it to the general pattern of European political, social and cultural achievements: the essence of Gothic art, the politics of Frederick II, the Holy Roman Empire, the Medici, Mazzini and Mussolini, the *Carboneria* and the Fascisti."

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"Cultural Factors in the History of the South," by Richard H. Shryock. *The Journal of Southern History,* V, 3 (August, 1939), 333–46.

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"Agrarianism and the Jeffersonian Philosophy," by Patrick F. Quinn. *Ibid.,* 87–104.

"The Elements of Folk Tales. A Study in Prelogical Thought," by A. Solymossy. *The Hungarian Quarterly,* V, 3 (Autumn, 1939), 505–16.

"Hungarian Middle Ages," by Christopher Dawson. *Ibid.,* V, 4 (Winter, 1939/40), 585–90. "The publication of a definitive critical edition of the medieval Hungarian chronicles . . . bears witness . . . to the remarkable unity and continuity of tradition which make it possible for the Magyars to preserve their national consciousness unbroken through the revolutionary change of culture which accompanied the incorporation of Hungary in Western Christendom."

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"Bonapartism and Dictatorship," by Frederick B. Artz. *The South Atlantic Quarterly.* Vol. 39, no. 1 (Jan. 1940) 37–49.

CORRESPONDENCE

PUBLICATION OF THE ORIGINAL RECORDS OF BROOK FARM, AND RELATED DOCUMENTS

With the permission of the Massachusetts Historical Society, owner of the manuscripts, the original records of Brook Farm are being edited for publication by the undersigned. [Dr. Bestor is author of a history of Fourierist socialism in the United States.] Besides printing for the first time the official records of this important Transcendentalist co-operative community, the editor proposes to bring together in the work a number of hitherto unpublished manuscripts relating to Brook Farm and the Fourierist movement. The New York Public Library has already given authority to publish an extensive correspondence between Parke Godwin in New York and other editors of the *Harbinger* at Brook Farm. Extracts will also be made from certain contemporary published sources, many of them located during the editor's research in Fourierist periodicals and not hitherto reprinted. Finally, the introductions, footnotes, and bibliography of the volume will give opportunity for references to the other known sources, the editor's aim being to list these as completely as possible.

The editor solicits the aid of librarians, scholars, and collectors in locating manuscripts that may not have come to his attention, particularly letters written from Brook Farm or diaries kept by members of the community. Any material received will be promptly returned by registered mail and full acknowledgment will of course be made in the published volume. Criticisms of the plan or arrangement of the work as tentatively outlined here will also be gratefully received.

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ACKNOWLEDGEMENT

The Editor has learned with regret, since the appearance of No. 1 of this *Journal*, that the greater part of the article in that issue by Mr. Bertrand Russell, "Byron and the Modern World," had been published in *The Saturday Review of Literature* of Feb. 12, 1938. Of the fact of prior publication the author, through separation from his files abroad, was unmindful, and the article was received from him by the Editors as "hitherto unpublished." Acknowledgement is due the Editors of *The Saturday Review* for their courteous acceptance of this inadvertent reprinting of material already published and copyrighted by that journal.

ERRATUM

A STUDY OF HISTORY, by Arnold J. Toynbee, was listed erroneously as a Macmillan publication. The work, six volumes thus far, is published by the Oxford Press. It will be reviewed at length by Professor John Herman Randall, Jr.